ELECTRICAL REVIEW

OVEMBER 1957

him

Osram

THE WONDERFUL LAMP

Cablemaking today
is largely a matter
of research, experience,
materials, and methods
of quality control—
many of which we have
pioneered ourselves.
But the core of a cable
is copper wire.
So we start with
a further advantage . . .
even the copper is refined
and drawn
under our own control.

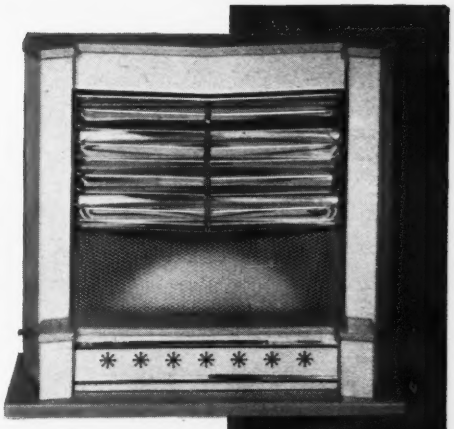
BICC | Cablemakers - from start to finish !

BRITISH INSULATED CALLENDER'S CABLES LIMITED, 21 BLOOMSBURY ST., LONDON, W.C.1

WARMTH

around the House with

Heatrae



Heatrae products can be recommended with confidence as the best in heating equipment.

For house-warming, Heatrae offer a range of electrical air heaters and electric fires which are attractive in both appearance and economy.

Designed by specialists, the MAJESTIC—DANDY and PILOT meet the most stringent regulations and are of sound construction throughout.

For your customers' satisfaction, specify HEATRAE.

Write for a supply of Leaflets NOW !

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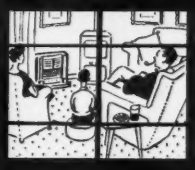
HEATRAE LTD • NORWICH

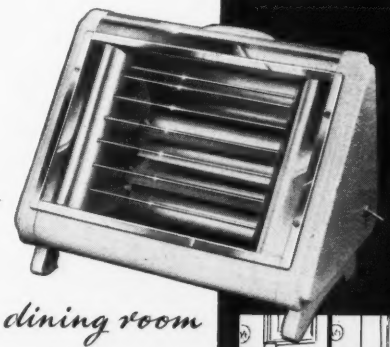
Pioneers in All-British Electric Heaters

Manufacturers of: Electric Water Heaters, Immersion Heaters, Oil Heaters, Urns, Towel Rails, Airing Cupboard Heaters, Flameproof Heating Apparatus, Electric Fires, Food Trolleys, Warming Plates, Air Heaters, etc.

In the Lounge

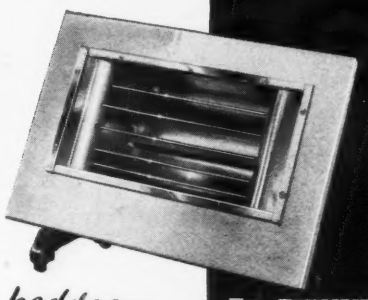
The MAJESTIC electric fire for comfortable warmth. Durable and so attractive.





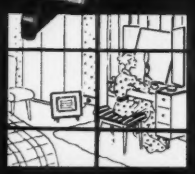
In the dining room

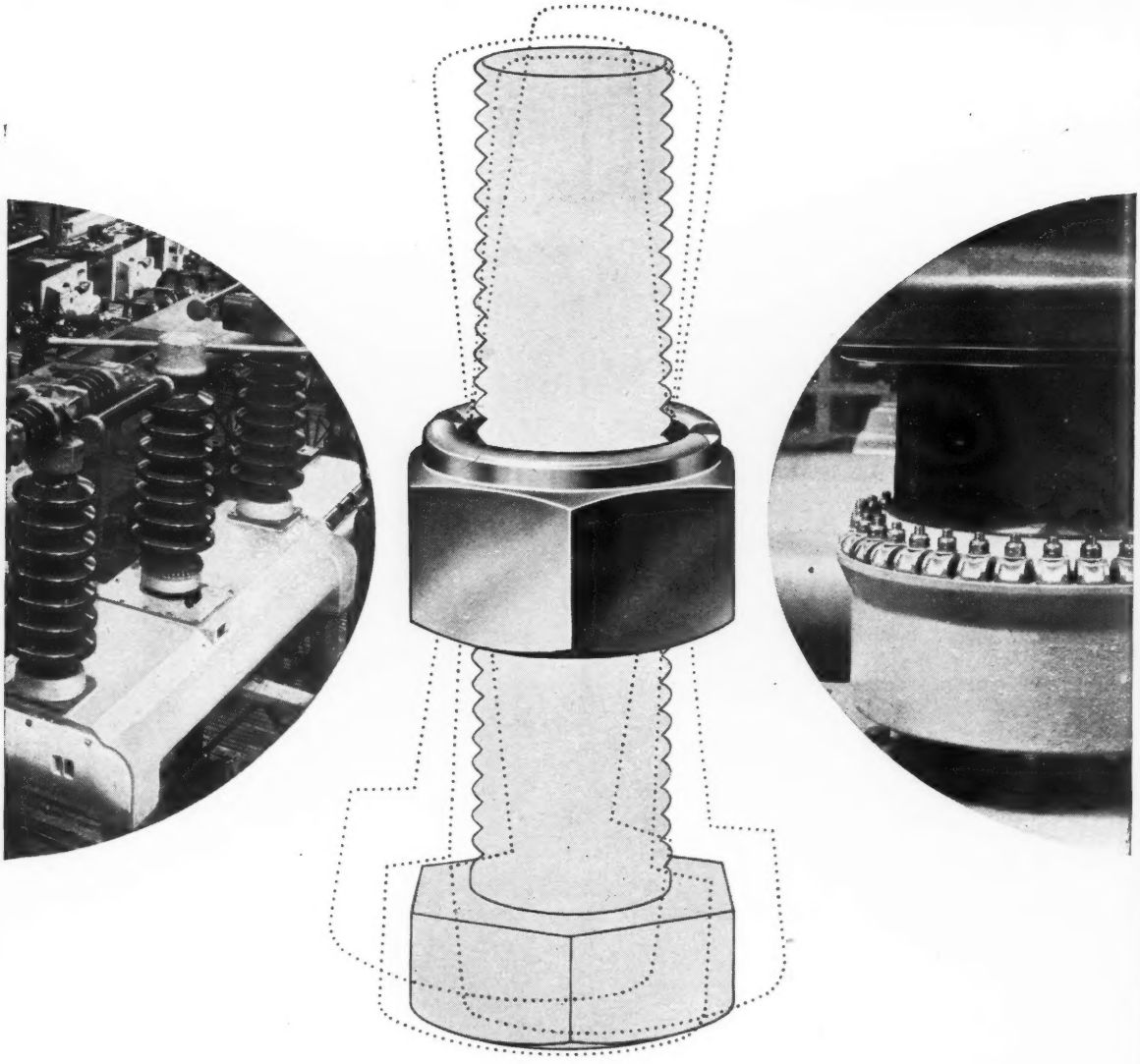
The elegant DANDY radiates glowing warmth and combines efficiency with safety.



In the bedroom

The PILOT portable electric fire for cheerful warmth at low costs.





Nothing rattles the Nyloc

Tough nuts, these Nylocs! Rock them, shock them, vibrate them —nothing but a spanner works them loose. Metropolitan-Vickers built this 132 kV. airblast circuit-breaker equipment for outdoor installation, in the sort of climatic conditions that would work any normal nut loose. Up to 48 Nylocs are used around the base of each porcelain insulator. They keep a firm hold and ensure a watertight seal around the porcelain and along the stud threads.

The fibre nut with fibre insert and the all-metal Pinnacle are just as stubborn—and each has its special uses. Drop us a line and we'll advise you which nut is best for *your* job.

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BIL MAJESTIC

THE NEW LOOK IN SWITCHGEAR

BIL MAJESTIC HEAVY DUTY CUBICLE SWITCHBOARDS

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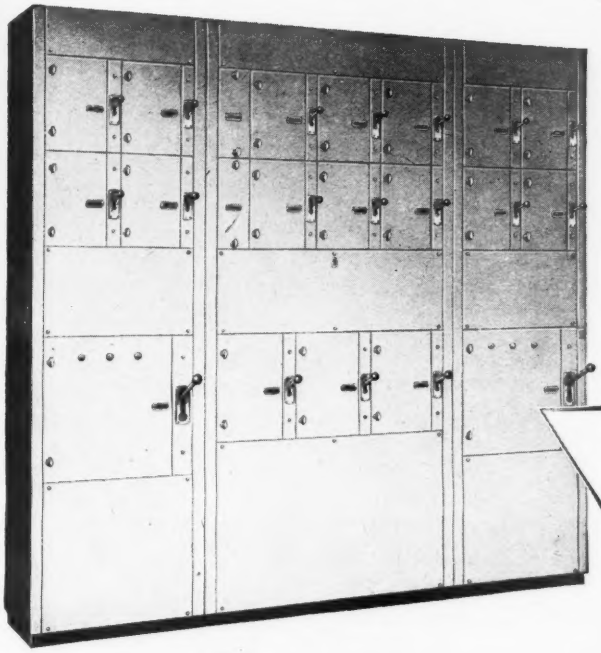
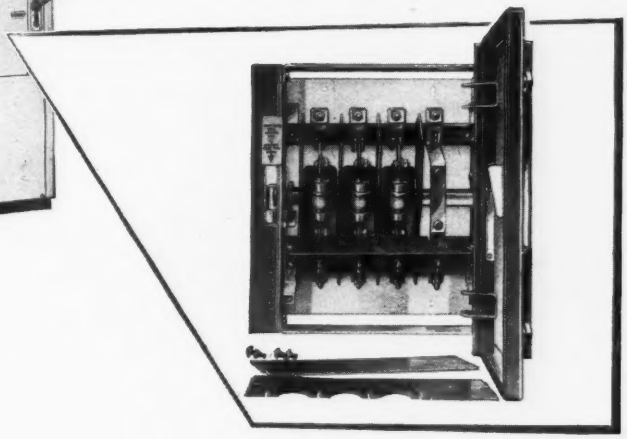
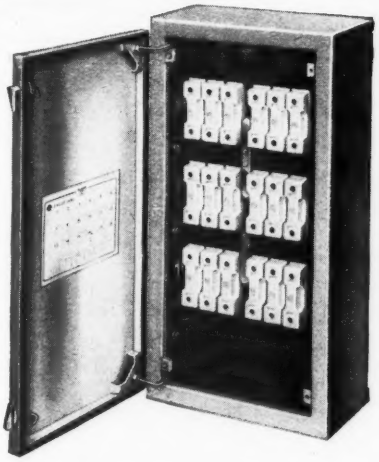
- CAN BE SUPPLIED WITH BUILT-IN FUSEBOARDS AND FLUSH TYPE METERING.
- A RANGE OF FLUSH MOUNTING FUSE-SWITCHES FROM 30 TO 800 AMPERES CAN ALSO BE SUPPLIED AS SEPARATE UNITS.
- FULLY ILLUSTRATED IN PUBLICATION MCP 1057.







BIL MAJESTIC DISTRIBUTION BOARDS

- CLEAN AND ATTRACTIVE MODERN APPEARANCE.
- SIMPLIFIED MAINTENANCE.
- HEAVY DUTY BIL ARC DAMPING OR H.R.C. FUSES.
- FULLY ILLUSTRATED IN PUBLICATION MDB 1057.

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ASHTON
Welding Cables

Specification B.S. 638/1954.

NORMAL TYPE : HEAVY TYPE.
SPECIFICATION B.S. 638/1954.
SINGLE CORE FLEXIBLE CABLES
HAVING CONDUCTOR OF HIGH
CONDUCTIVITY TINNED COPPER
WIRES, LAPPED WITH SEPARATOR
VULCANISED RUBBER INSULATOR,
& TOUGH RUBBER SHEATHED.

Always specify ASHTON Rubber and ASHATHENE Thermoplastic Cables and Flexibles by

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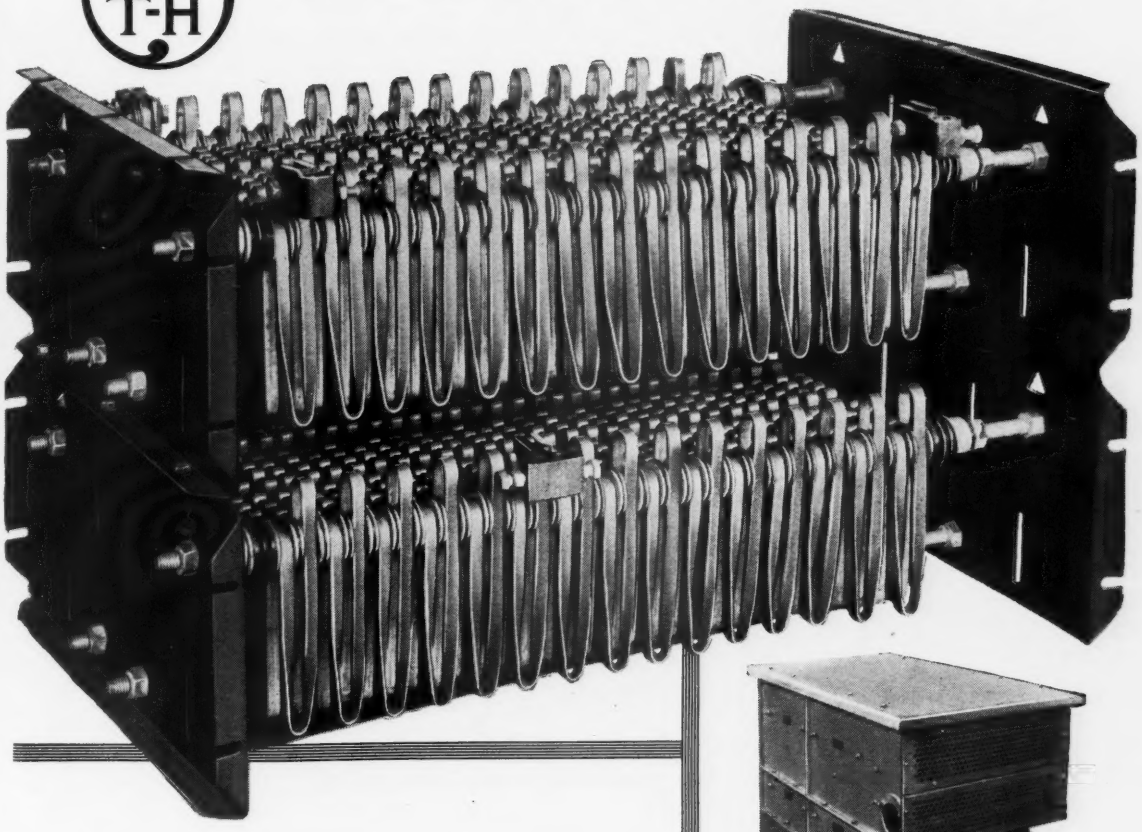
CW 4574

Virtually unbreakable

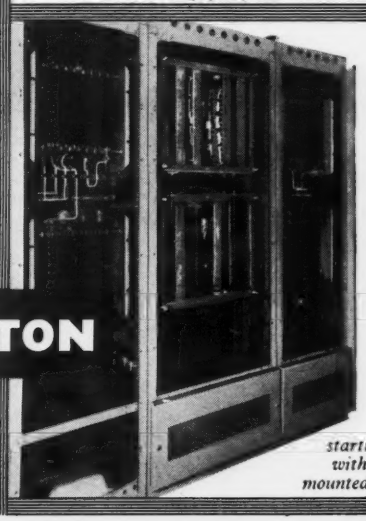
B T-H HEAVY-DUTY GRID RESISTORS



Designed to take shocks and knocks, these BTH grid resistors are rugged without being heavy or unwieldy. Special high-resistance steel strip or square wire provides the exceptional combination of electrical and mechanical properties.

- **RESILIENT**— virtually unbreakable
- **RUSTPROOF**— elements heavily zinc coated
- **COMPACT** and **LIGHT** in weight
- **WIDE RANGE** of sizes and enclosures
- **EARLY DELIVERY**

Three-tier drip-proof resistance unit.



Motor starting panel with resistors mounted at rear.

BRITISH THOMSON-HOUSTON

COMPANY LIMITED · RUGBY · ENGLAND

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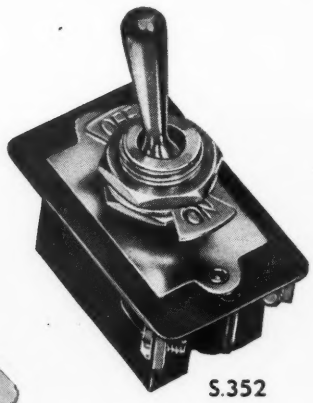
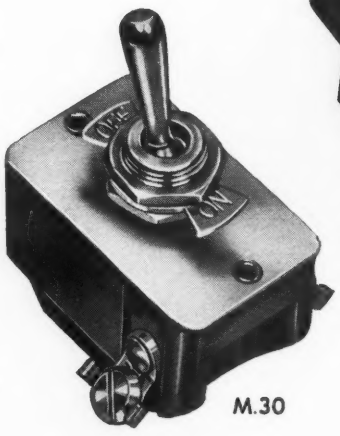
A 5153

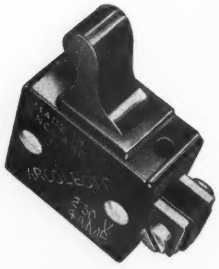
ARCOLECTRIC SWITCHES



S.352

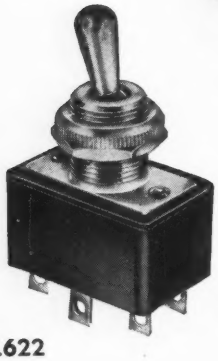


M.30

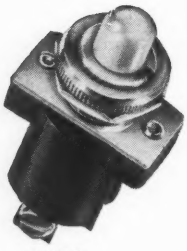


S.700

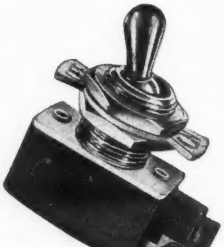
S.510



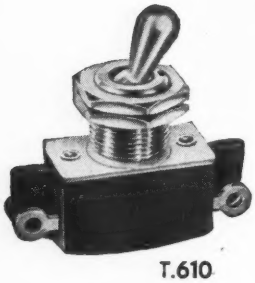
T.622



S.930



G.600



T.610

S.352: Toggle Switch, 5-amp., 250v.

M.30: Toggle Switch, 10-amp., 250v.—Suitable for electric fires.

S.700: Toggle Switch, 4-amp., 250v.

S.510: Biased Push Button Switch.

T.622: Toggle Switch, 3-amp., 250v.—Double pole change-over.

S.930: Door Switch, 1-amp., 250v.—For refrigerators.

G.600: Toggle Switch, 3-amp., 250v.

T.610: Toggle Switch, 3-amp., 250v.—Single pole double throw.

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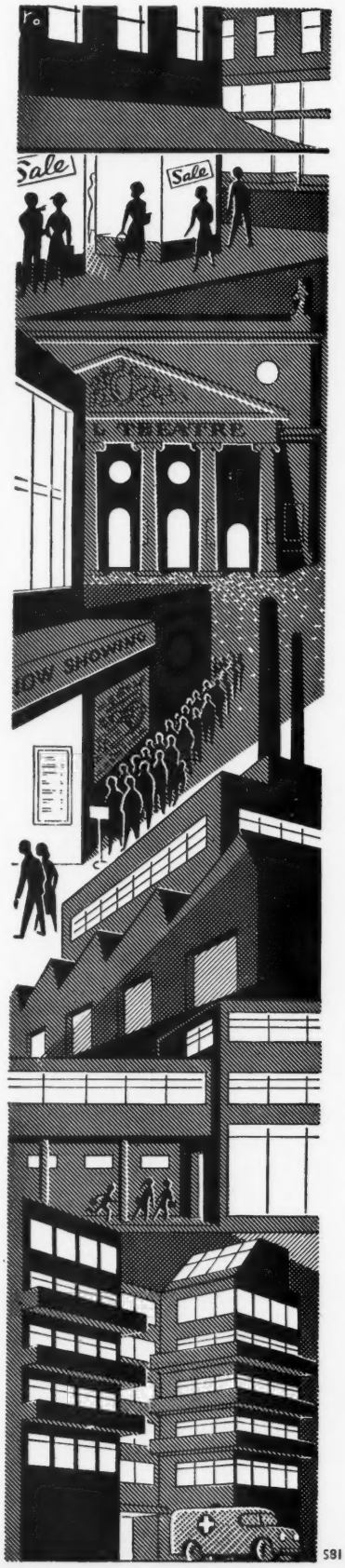
ARCOLECTRIC SWITCHES · LTD

"When there is a better switch ARCOLECTRIC will make it"



Every other day

THERE'S NO GLAMOUR about emergency lighting. No social prestige, either. All over the country, tens of thousands of ambitious young husbands are definitely *not* saying, 'Darling, the very next time the boss raises my salary, we'll install emergency lighting.' Until they get round to becoming responsible for such concerns as Banks or Hospitals or Cinemas or Big Stores or Dance Halls or Art Galleries or Power Stations, they won't need it.

It seems surprising, in the circumstances, that another Keepalite automatic emergency lighting unit is installed every other day. And more than 5,500 have been installed already.

The fact is that the people who do need emergency lighting predominantly choose Keepalite—and for very good reasons. Keepalite is automatic. Automatically switches itself on in the actual instant of mains interruption: automatically trickle charges its battery between times. Keepalite also has the advantage of being backed by the full resources and services of the biggest battery manufacturing company in the British Commonwealth. And Keepalite is very easy to install. The free advisory service of our electrical engineers makes sure of that!

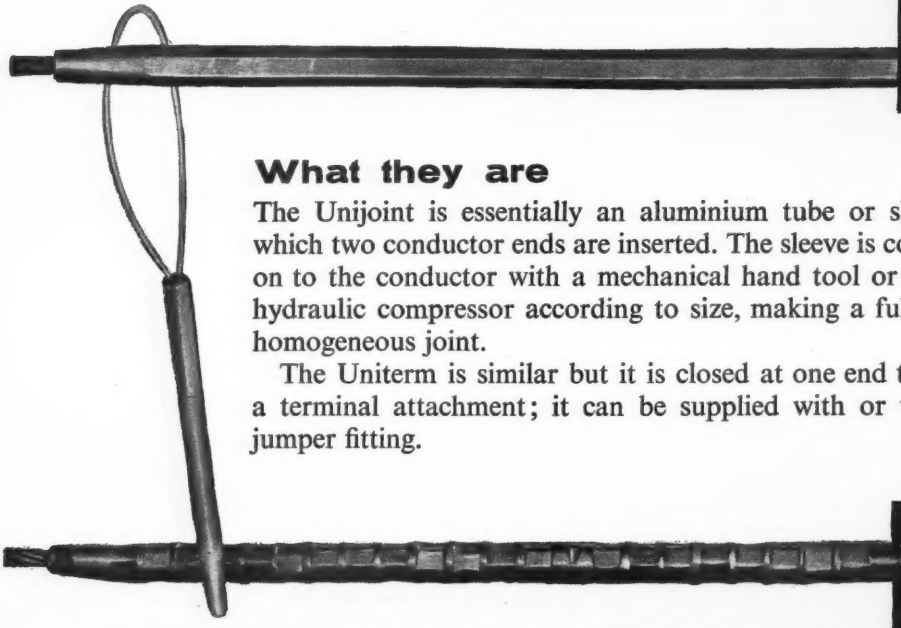
Keepalite

AUTOMATIC EMERGENCY LIGHTING EQUIPMENT

For every purpose — large or small

A PRODUCT OF CHLORIDE BATTERIES LIMITED
Exide Works · Clifton Junction · Swinton · Manchester
and Grosvenor Gardens House, Grosvenor Gardens, S.W.1
Offices at Belfast · Birmingham · Bristol · Glasgow and Leeds

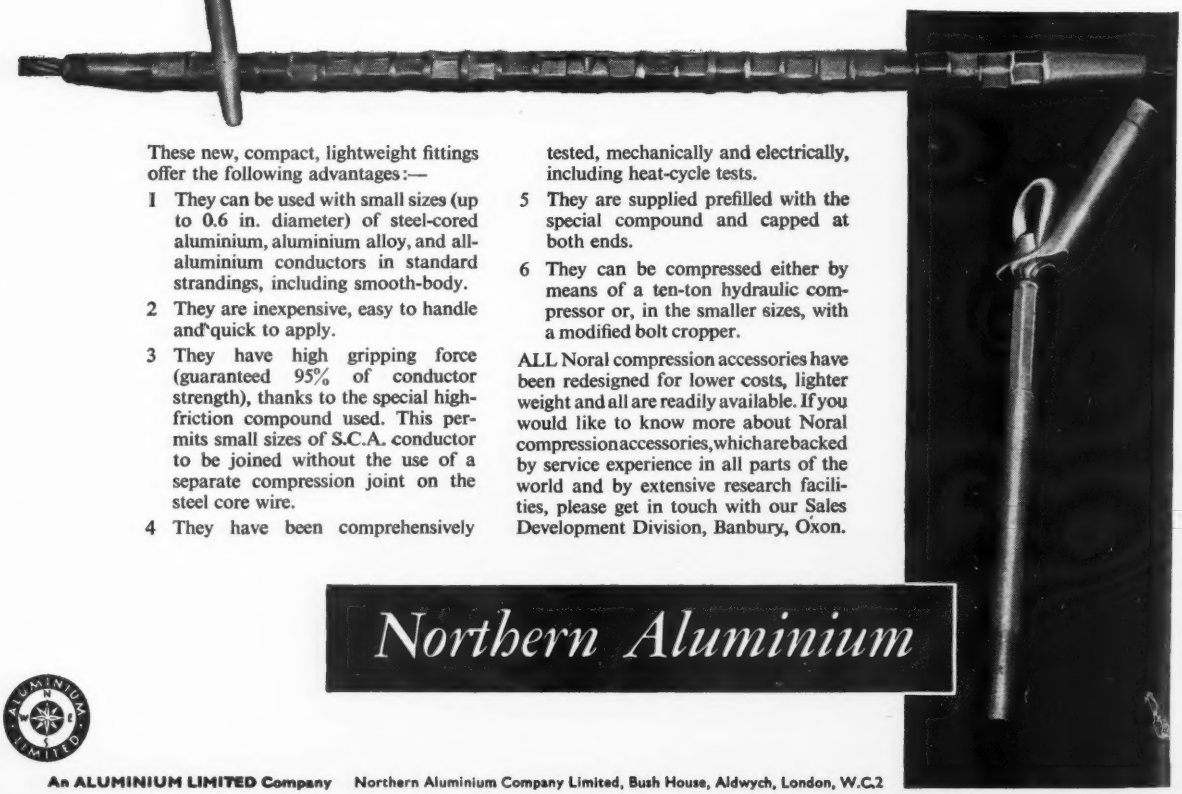
UNIJOINT
and
UNITERM
new high-efficiency conductor accessories



What they are

The Unijoint is essentially an aluminium tube or sleeve into which two conductor ends are inserted. The sleeve is compressed on to the conductor with a mechanical hand tool or a ten-ton hydraulic compressor according to size, making a full-strength homogeneous joint.

The Uniterm is similar but it is closed at one end to provide a terminal attachment; it can be supplied with or without a jumper fitting.



These new, compact, lightweight fittings offer the following advantages:—

1 They can be used with small sizes (up to 0.6 in. diameter) of steel-cored aluminium, aluminium alloy, and all-aluminium conductors in standard strandings, including smooth-body.

2 They are inexpensive, easy to handle and quick to apply.

3 They have high gripping force (guaranteed 95% of conductor strength), thanks to the special high-friction compound used. This permits small sizes of S.C.A. conductor to be joined without the use of a separate compression joint on the steel core wire.

4 They have been comprehensively tested, mechanically and electrically, including heat-cycle tests.

5 They are supplied prefilled with the special compound and capped at both ends.

6 They can be compressed either by means of a ten-ton hydraulic compressor or, in the smaller sizes, with a modified bolt cropper.

ALL Noral compression accessories have been redesigned for lower costs, lighter weight and all are readily available. If you would like to know more about Noral compression accessories, which are backed by service experience in all parts of the world and by extensive research facilities, please get in touch with our Sales Development Division, Banbury, Oxon.

Northern Aluminium

An ALUMINIUM LIMITED Company Northern Aluminium Company Limited, Bush House, Aldwych, London, W.C.2

Here's *where* and *why* you'll find Du Pont neoprene-jacketed cable in use today

	Sunlight and weather resistance	Oil resistance	Grease resistance	Abrasion resistance	Ozone resistance	Flexibility	Heat resistance	Chemical resistance	Flame resistance	Fungus resistance	Ease of installation	Dimensional stability
Underground—buried or in ducts					✓			✓		✓	✓	✓
Suspended outdoors	✓			✓	✓			✓		✓	✓	✓
In tropical climates	✓				✓		✓			✓		
On trucks, automobiles, railroads	✓	✓	✓	✓	✓	✓	✓					✓
On ships and airplanes	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓
In underground coal mines				✓	✓	✓		✓	✓	✓		
In chemical plants					✓		✓	✓				
In oil refineries		✓	✓		✓		✓	✓				
In power plants	✓				✓						✓	
In steel mills, plating plants			✓	✓	✓		✓	✓	✓			✓
On outdoor cranes, shovels, welding and construction equipment	✓	✓	✓	✓	✓	✓				✓		✓
On indoor hoists, elevators		✓	✓	✓	✓	✓						
On portable tools in machine shops, garages		✓	✓	✓	✓	✓						
On kitchen appliances		✓	✓	✓	✓	✓	✓	✓	✓			✓

IF YOU WANT A CABLE THAT WILL GIVE LONGER SERVICE— INSIST ON DU PONT **NEOPRENE-JACKETED** CABLE

FREE! The Neoprene Notebook. Each issue is filled with interesting case histories about Du Pont neoprene . . . tells how it improved old products, how it helped develop new ones. Clip coupon to get on the mailing list.

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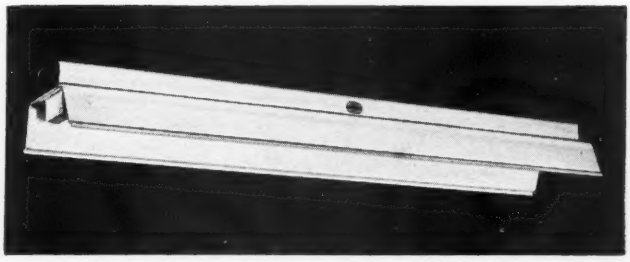
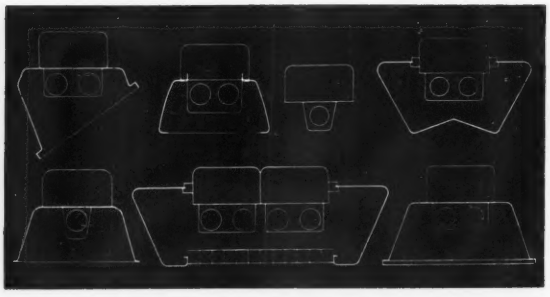
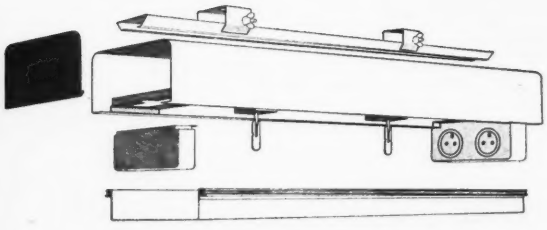
A FAMILY OF 366 FLUORESCENT FITTINGS

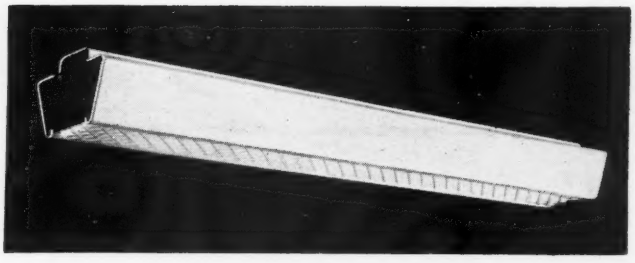
The Atlas Atlantic range provides an unfettered choice of fluorescent lighting fittings for all lighting applications—industrial, commercial or general purpose. The choice runs to type of fitting, length, number of tubes, gear, suspension, etc., yet the entire range stems from one basic chassis and a few simple attachments. This degree of standardisation, coupled with unique design features, greatly simplifies installation —particularly in coping with changes in large installations. Maintenance is easy, efficiency and quality are of a very high order and prices competitive.







Features of the Atlas Atlantic chassis include:
8ft., 5ft., 4ft. or 2ft. sizes. Single, twin or multiple tubes; bi-pin spring loaded lampholders; enclosed switch- or quick-start gear, easily detachable reflectors or diffusers; fixed or adjustable suspension.



atlas atlantic

Top right. The range includes Industrial fittings with single piece open-ended slotted metal reflectors (series 10), closed end, slotted reflectors (series 103), open or closed end unslotted reflectors (series 19/193) and metal louvre attachments (series 10L and 19L). All metal work is stove enamelled white, with black ends to chassis.

Bottom right. A wide choice of decorative fittings for commercial applications is available. Series 15 (illustrated) have louvred plastic diffusers that snap into foam plastic filled channels; and are white stove enamelled with black end plates.

ATLAS leads in Lighting

ATLAS LIGHTING LIMITED *A subsidiary company of Thorn Electrical Industries Limited* 233 SHAFTESBURY AVENUE LONDON WC2

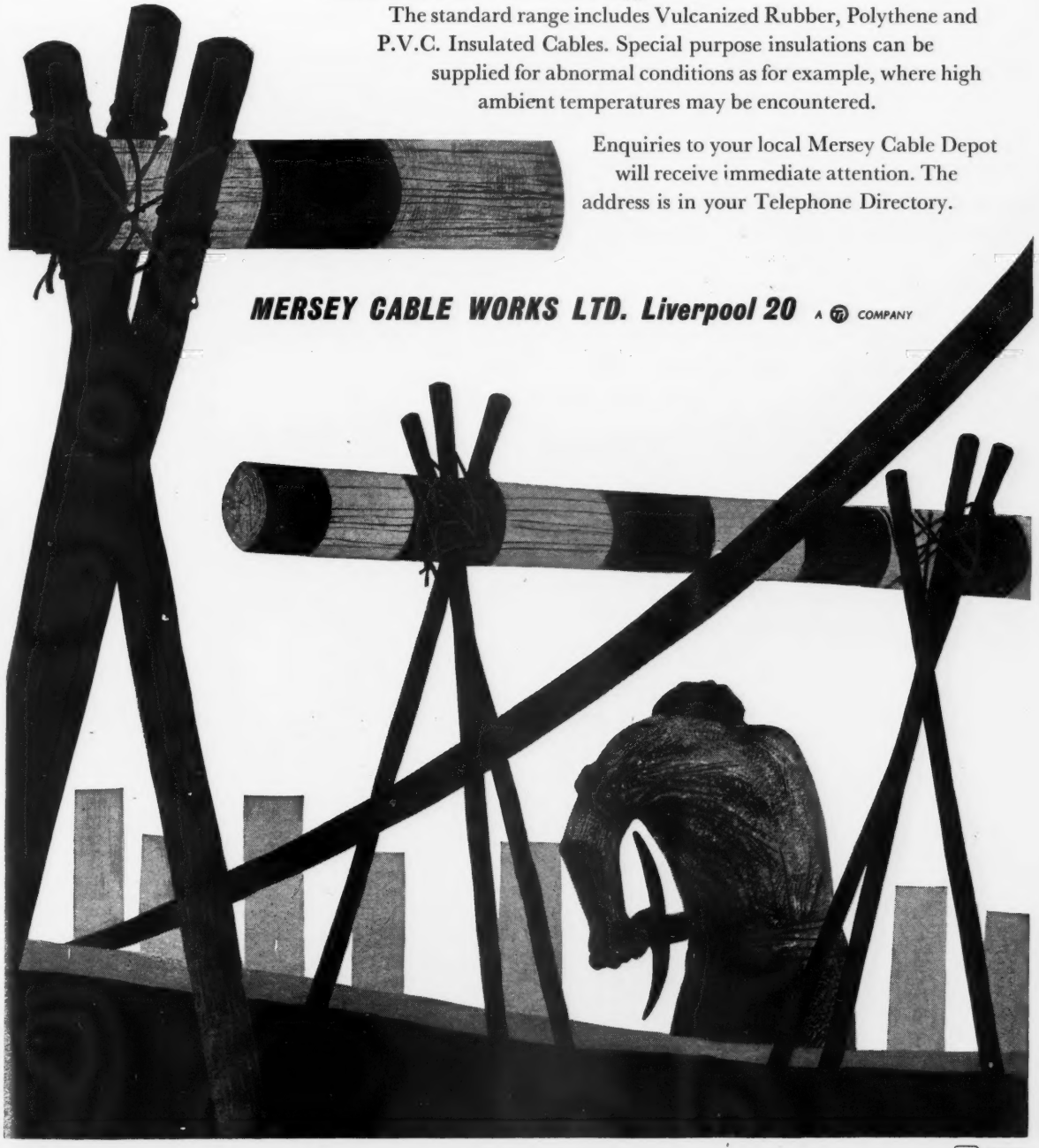
problems of power

Of course you meet problems at times, when power supplies have to be made available for Domestic and Industrial use. But, they are not your problems alone, Mersey Cables share them—and solve them, offering solutions to meet your individual needs.

Cables are a specialist's job, and if it's your job to think about power cables and the most efficient way of conveying power right to the place where it will be used, remember that Mersey Power Cables are produced in a complete range of standard sizes, and special cables can be made for unusual applications.

The standard range includes Vulcanized Rubber, Polythene and P.V.C. Insulated Cables. Special purpose insulations can be supplied for abnormal conditions as for example, where high ambient temperatures may be encountered.

Enquiries to your local Mersey Cable Depot will receive immediate attention. The address is in your Telephone Directory.



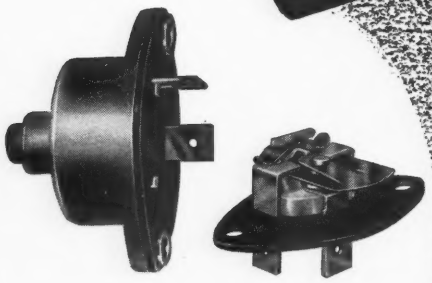
MERSEY CABLE WORKS LTD. Liverpool 20 A COMPANY

MCW3

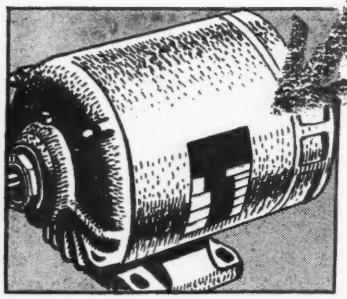
The NEW

Otter

MOTORGUARD



★ Otter blade heats quicker than motor windings.
★ Mycalex insulation.
★ Contacts cannot be closed manually when overloaded.
★ No separate heater coil to burn out.
★ Designed to meet S.E.M.K.O. requirements.
★ Interchangeable with others.



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A range of sizes from 1" to 4" dia.

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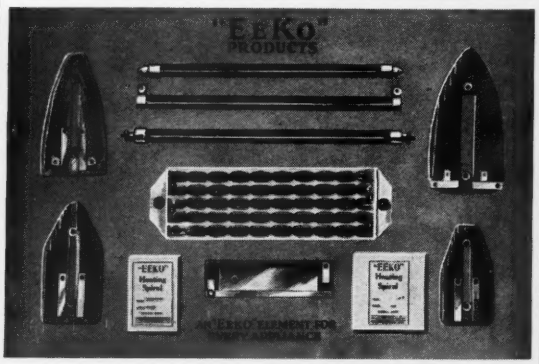

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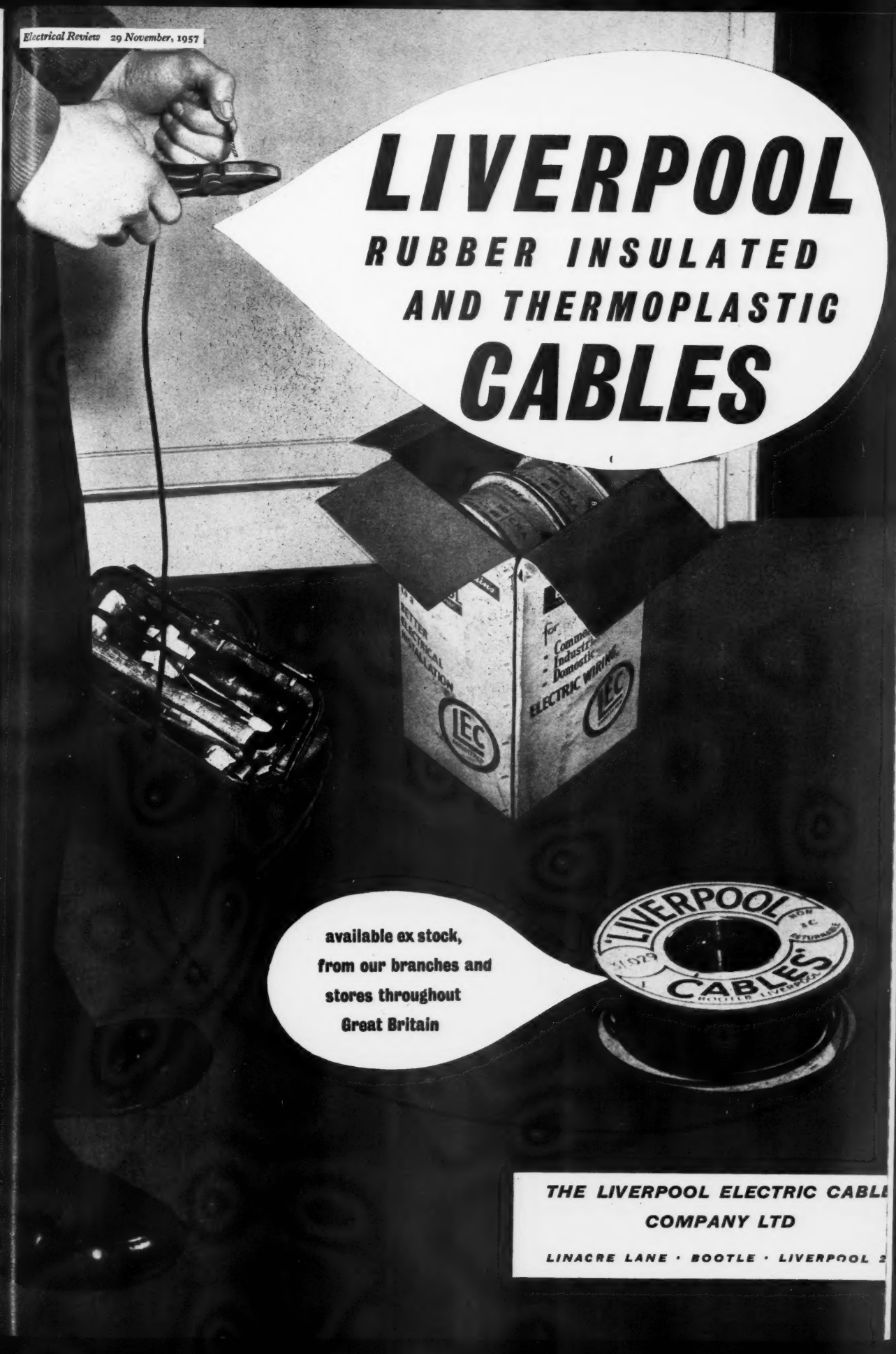
Makers of Elements since 1921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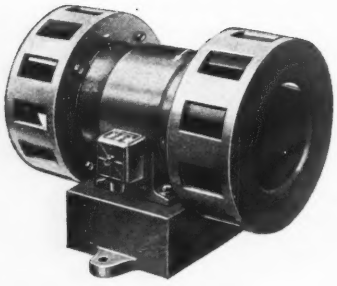
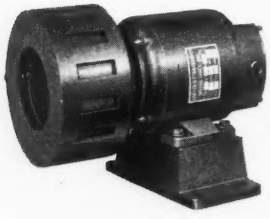
Full range of SIRENS to suit all requirements $\frac{1}{10}$ H.P. to 10 H.P.

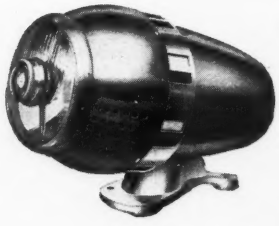
Officially approved by all Government Depts. As used by Admiralty, M.O.S., War Office, Crown Agents and U.K. Atomic Energy Authority.



HORIZONTAL TWO NOTE
Standard type Air Raid Siren made in 2, 5 or 10 H.P.



$\frac{1}{2}$ H.P. HORIZONTAL TYPE SIREN
suitable for weaving and spinning mills.



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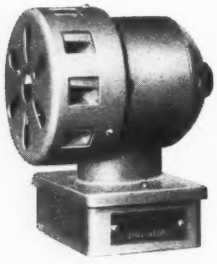

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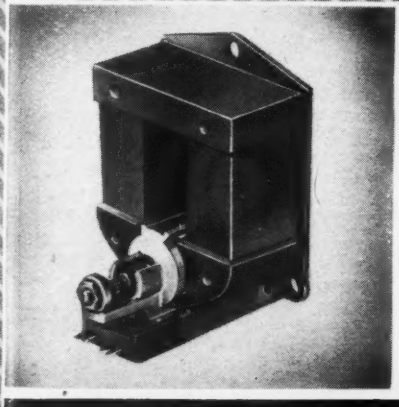

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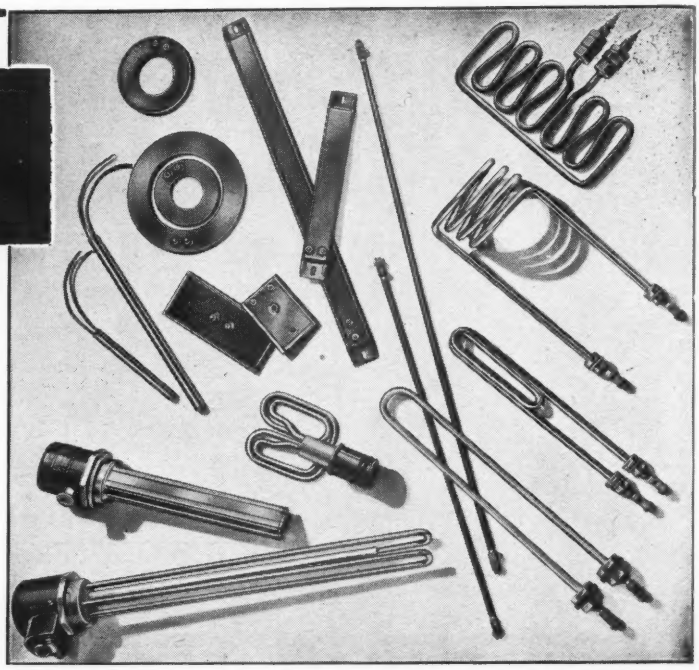

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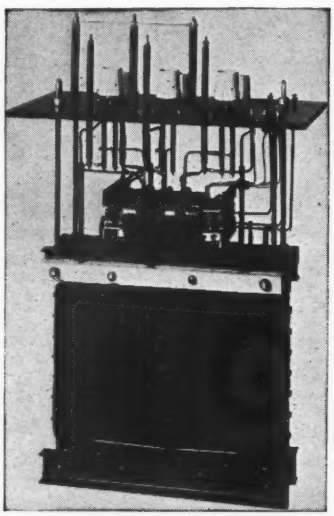

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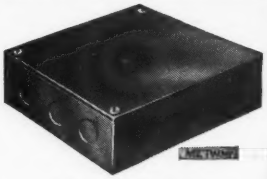

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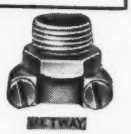

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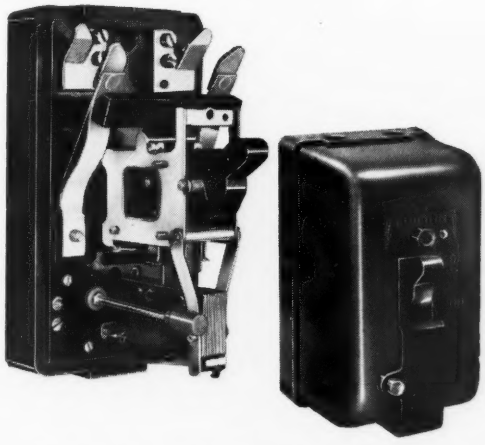
a 'down-to-earth' price for Chilton Earth Leakage Circuit Breakers 48/9



Chilton Earth Leakage Circuit Breakers

Type ELT/A (without overload protection). With its inherent simplicity of design this Earth Leakage Circuit Breaker fully complies with B.S.842 and provides complete protection against the possibility of shock. Suitable for all current ratings up to 60 amperes and with voltage ratings up to 500 volts A.C. A special unit for 100 ampere rating can be supplied to order. Chilton Earth Leakage Circuit Breakers are supplied in insulated moulded enclosures and the earth leakage tripping mechanism has been specially designed to ensure reliable operation even after long periods of inactivity in dirty, dusty, greasy or humid conditions. Units incorporating overload protection can be supplied to order.

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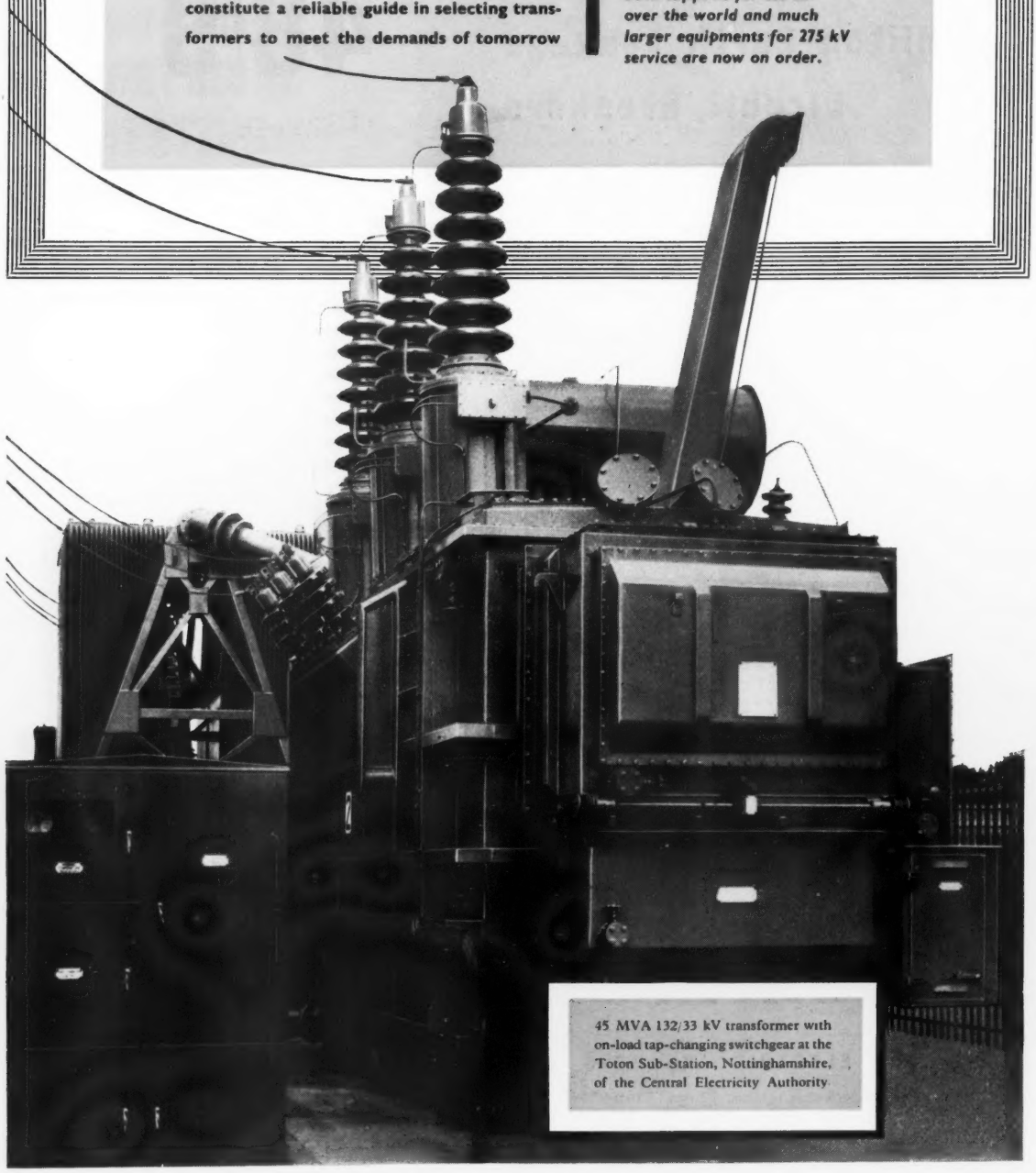

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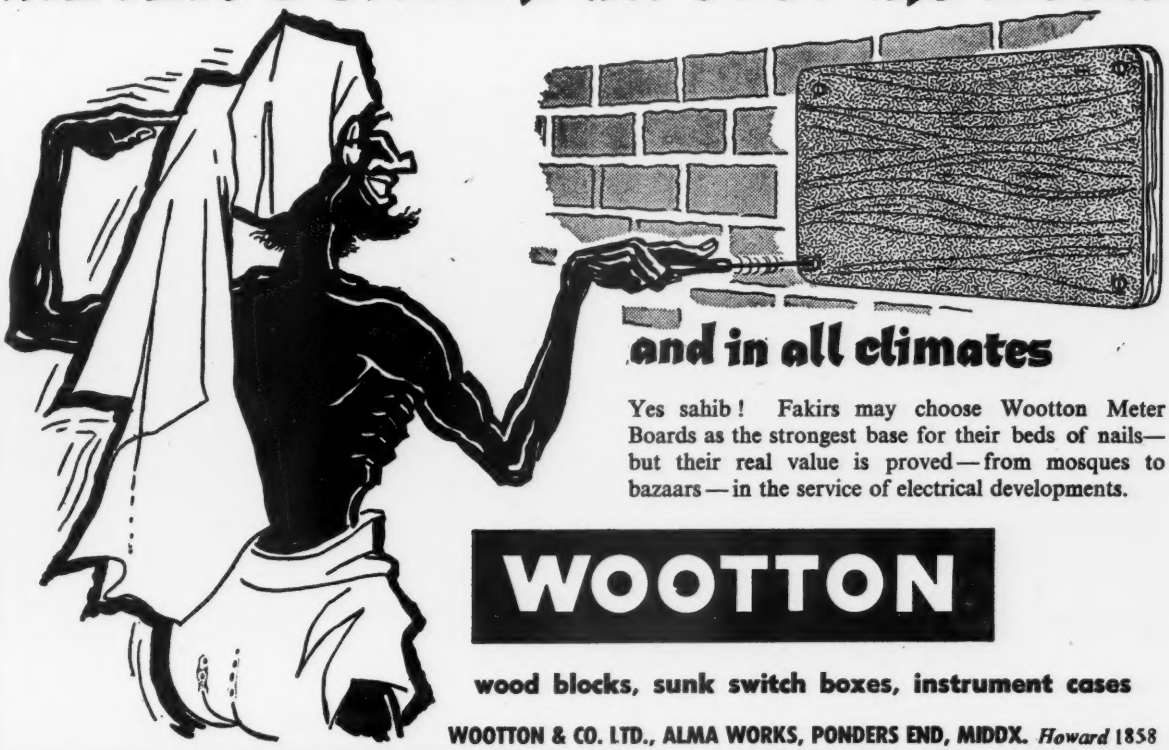

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wood blocks, sunk switch boxes, instrument cases

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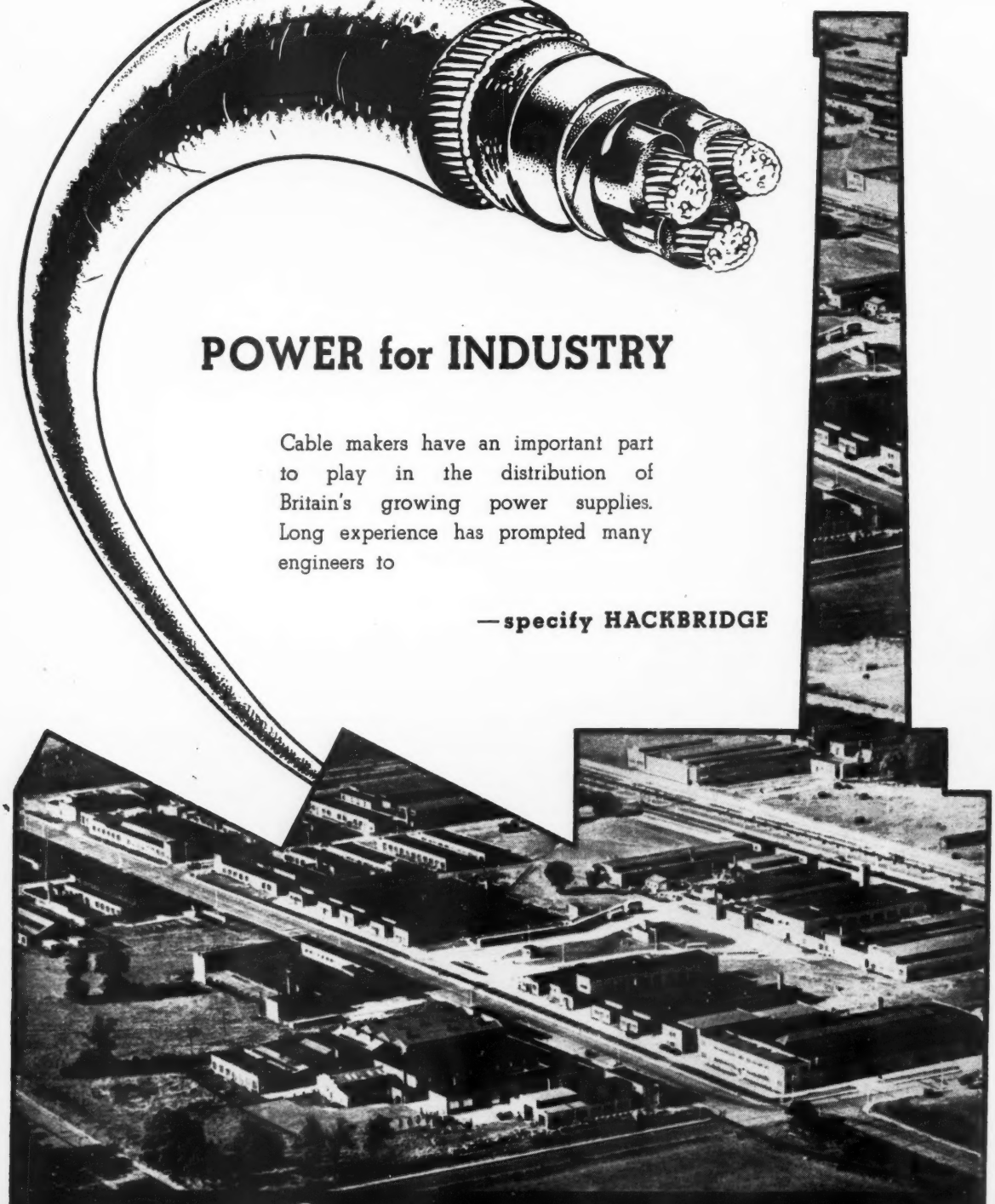

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In Association with BRYCE ELECTRIC CONSTRUCTION COMPANY LIMITED

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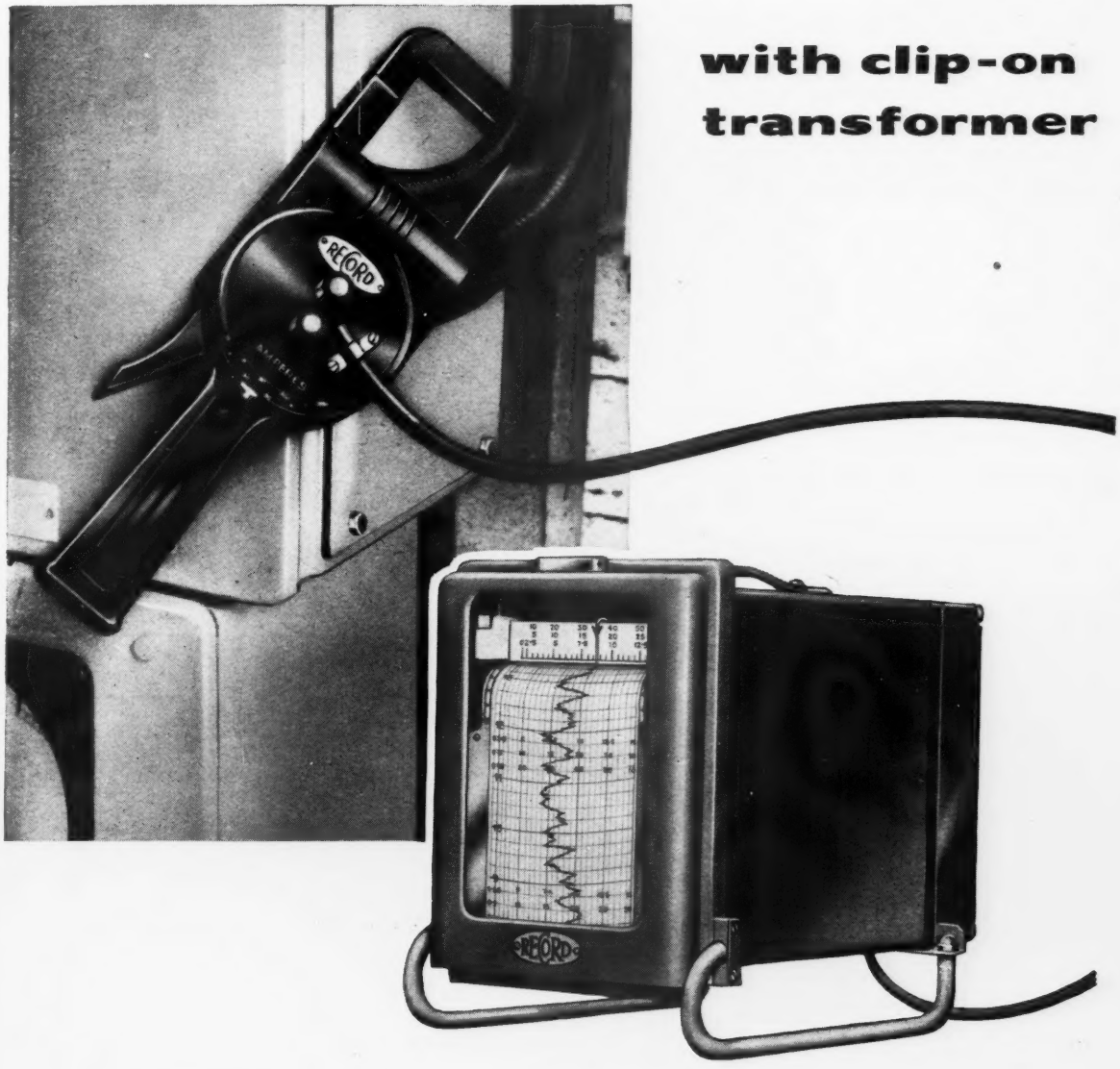
with clip-on transformer



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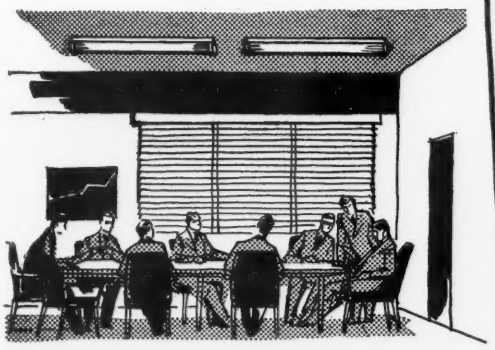

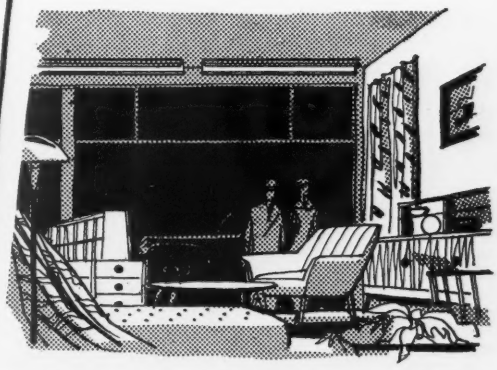

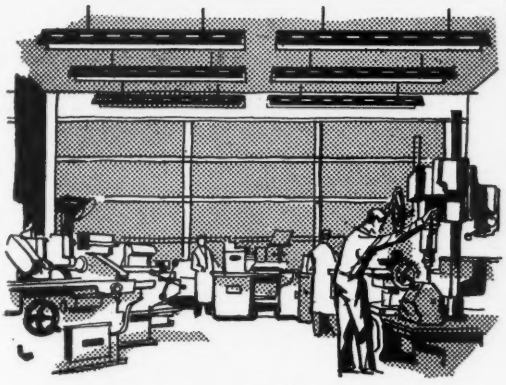

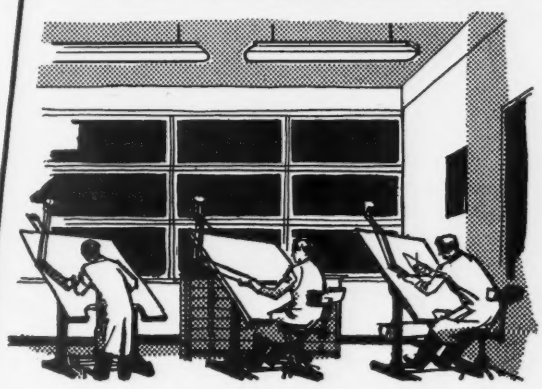

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EL42

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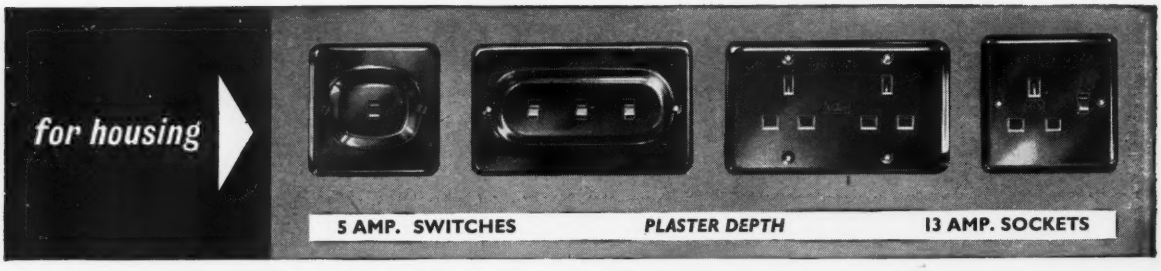

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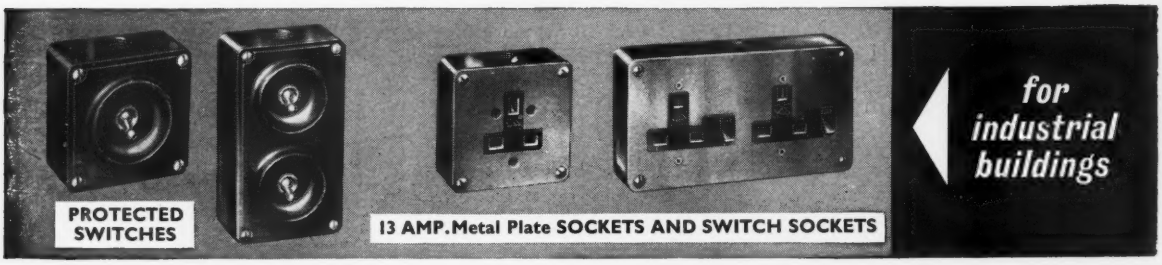

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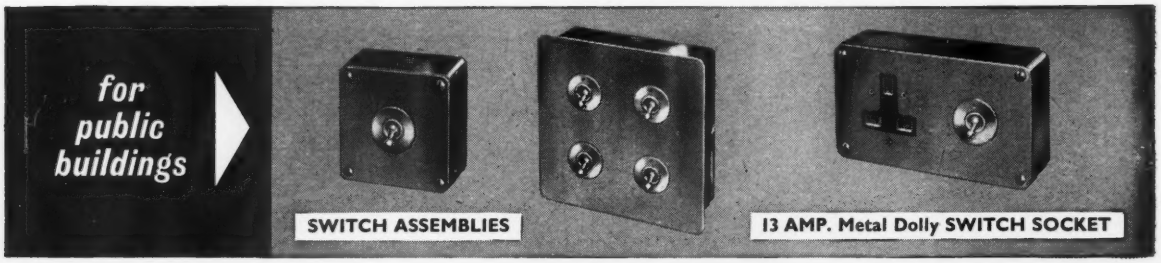
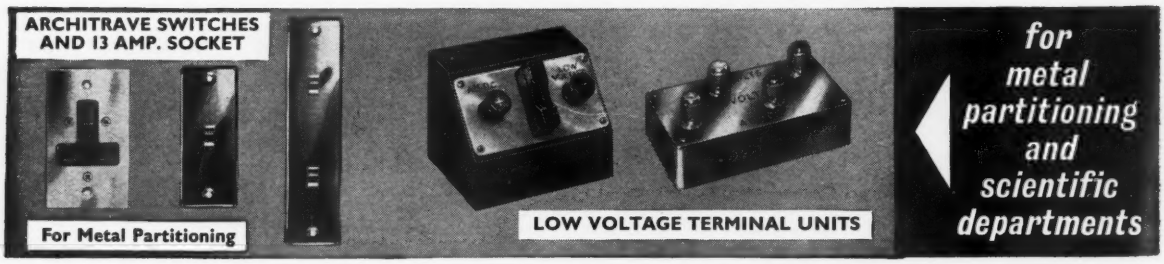


... approved by Contractors everywhere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from 1/25th. to 600 h.p.

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protect life—

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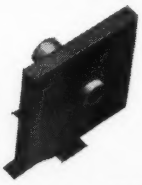

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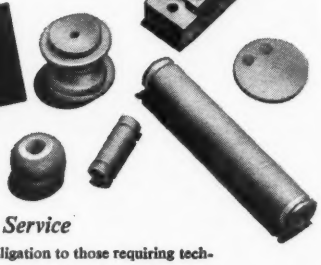

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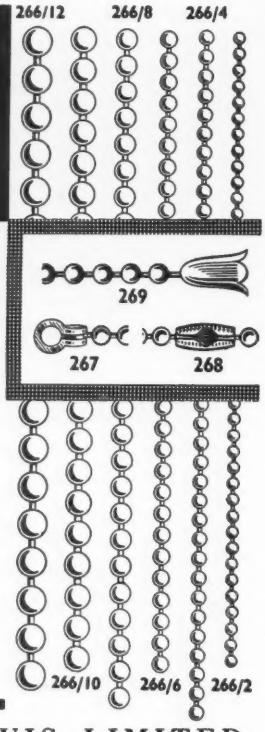

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LONDON OFFICE: 61/62, BROAD STREET AVE., BLOMFIELD ST., E.C.2.
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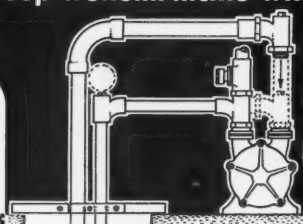
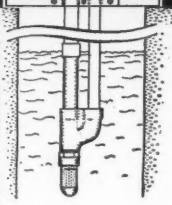
Deep wells...?...this will settle your water supply problem....





The unit costs £19.10.0d and pump from £24.12.6d according to output and type of motor

The Beresford "Hydro-Ejector" in conjunction with a Beresford single-stage, self-priming Pump will raise water as much as 170 feet from a well or bore-hole. It is simple to install and there are no electrical connections in the well. The system will provide adequate water for most domestic and many other needs, it is inexpensive and quite trouble-free in operation. May we send you details? Please ask for list PF.105

BN. 216

BERESFORD
'Hydro-ejector'
deepwell pumping attachment

GARNERCROFT

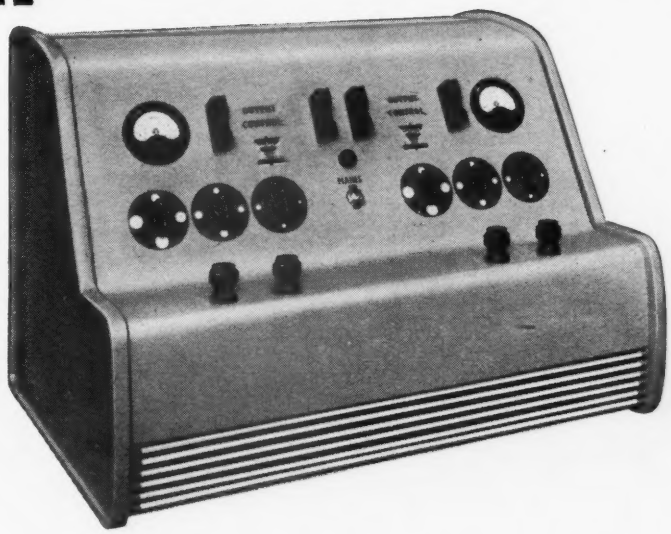
James Beresford & Sons Limited
Kitts Green, Birmingham 33
Telephone: STEchford 3081
And at London, Glasgow, Manchester, Leeds, etc.

NEW

CHARGING EQUIPMENT

for MODERN Service Stations

Model 1159. Input 200/250 volts 50 c/s. Output is two circuits. Each for 3-36 lead acid cells at 1-8 amperes with 63 step control.



SenTerCet
RECTIFIER EQUIPMENT
REGISTERED TRADE MARK

Engineered for rugged service . . . designed by industrial design specialists for pleasing appearance, accessibility of switches and easy observation of instruments whether the unit is bench or wall mounted, these new chargers fit well into modern garage or factory settings. The small or large vehicle operator's requirements are covered by the range of models available.

Write for leaflet.

Standard Telephones and Cables Limited

Registered Office: Connaught House, Aldwych, London, W.C.2

RECTIFIER DIVISION · EDINBURGH WAY · HARLOW · ESSEX

THE FINEST RANGE OF SMALL HORSE POWER MOTORS FOR ANY INSTALLATION

with the one-piece gearbox...

★ strong, stiff, a box casting always properly in line

★ with no possible oil leaks through joints

★ gears transmit 200 lb. ft. at 26 r.p.m. up to 480 r.p.m.

★ or 100 lb. ft. between 0.66 r.p.m. and 22 r.p.m.

★ foot or flange mounting

TYPE H.D. geared motors

A.C. or D.C. NECO motors of all fixed or variable speed types, made in the same factory as the gearbox, allow competitive prices and speedy delivery.

NECO TRADE MARK

NECO GEARED MOTORS LIMITED
a non-ring firm
OLD TOWN · LONDON · SW4
SUBSIDIARY OF NORMAND ELECTRICAL CO. LTD
Telephone : MACaulay 3211-4

An artist's impression of the nuclear power station being built at Bradwell, Essex

Nuclear Power will work for us all

In the next decade millions of pounds will be spent in developing Britain's national electricity supply; on generation; on extending the Grid and Supergrid systems of main transmission lines; and on strengthening and extending existing distribution networks. This expansion is essential if Britain's future prosperity is to be safeguarded.

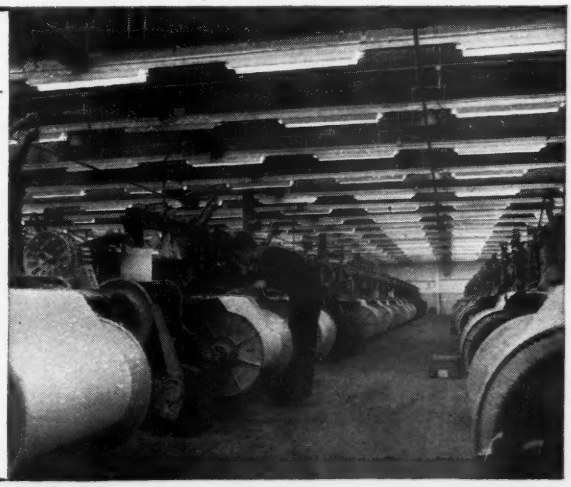
An important part of the expansion plan is the construction of enough nuclear power stations to provide 5 to 6 million kilowatts of power. But nuclear power stations cannot be built just anywhere. They must be near a very large water supply; they need very firm foundations to support the abnormally heavy weight of the nuclear reactors and associated plant; and, for economic reasons, they must be fairly close to the load to be supplied.

Because of this, and the fact that about 40% of total electricity consumption is in the southern half of the country, most of the nuclear power stations will be sited away from the major coalfields. The vast quantities of cooling water needed are rarely available elsewhere than on the coast or large estuaries. The existence of adequate foundations at possible sites can only be proved by trial borings.

Power stations, however, whether of nuclear or conventional type, are of no use without some means of getting the electricity to the consumer; and under modern conditions this means the Grid and Supergrid. Planned since the war to reinforce the 132,000 volt Grid, the 275,000 volt Supergrid will be a complementary part of Britain's nuclear power drive, connecting power stations to supply points feeding the distribution network.

The Grid and Supergrid lines are the outward and visible signs of the rejuvenation of Britain's power arteries. They are the life lines ensuring an increasingly prosperous future.

The pylons of Britain not only bring power to our factories, but also the lighting and ventilation that have made modern factories cleaner and brighter and happier places to work in.



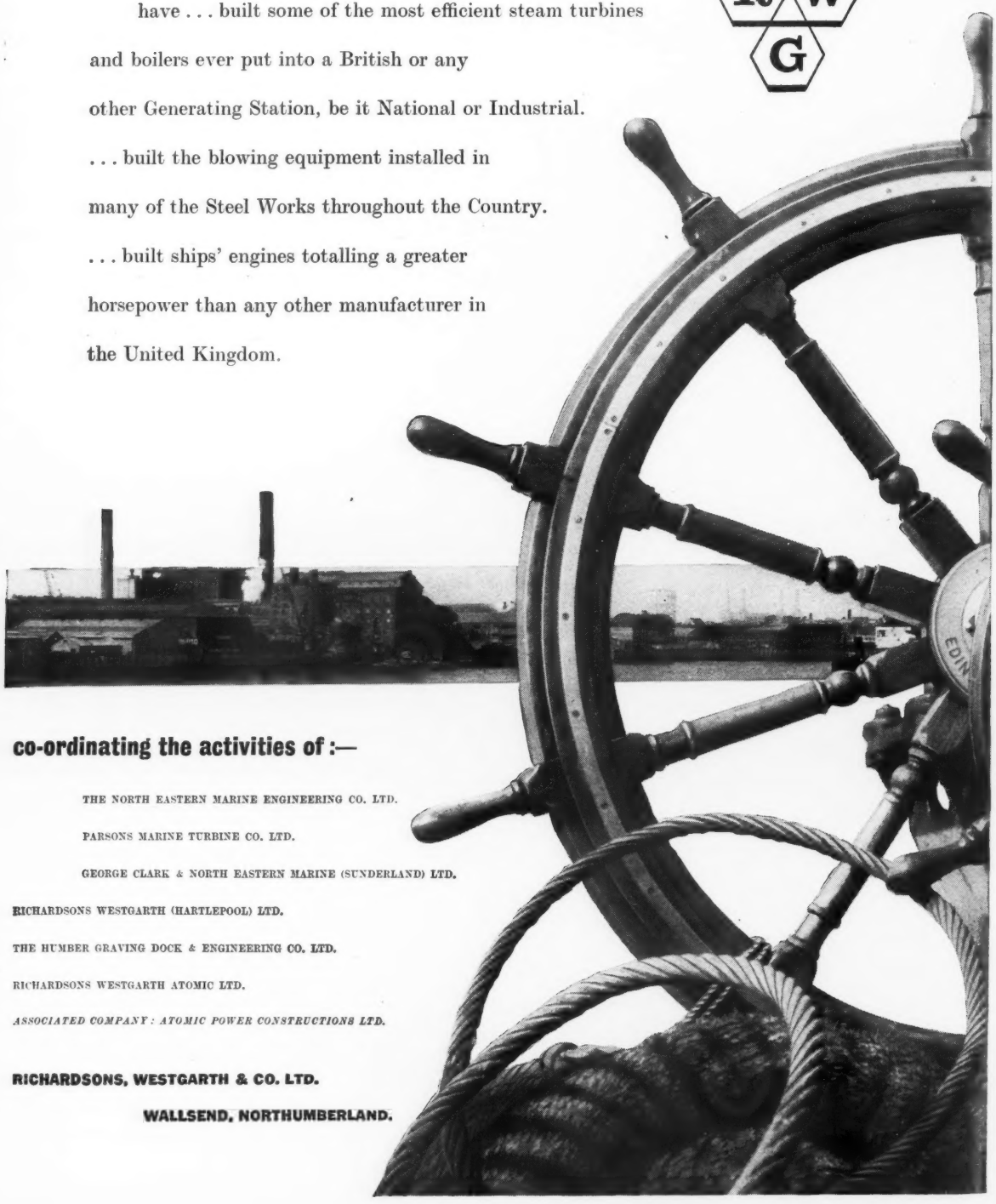
This series of advertisements is being published so that everyone will understand the nation's electric power programme and why it is necessary to have not only electric power stations but also pylons to carry the power where it is needed.

The Richardsons Westgarth Group

have . . . built some of the most efficient steam turbines and boilers ever put into a British or any other Generating Station, be it National or Industrial.

. . . built the blowing equipment installed in many of the Steel Works throughout the Country.

. . . built ships' engines totalling a greater horsepower than any other manufacturer in the United Kingdom.



co-ordinating the activities of :—

THE NORTH EASTERN MARINE ENGINEERING CO. LTD.

PARSONS MARINE TURBINE CO. LTD.

GEORGE CLARK & NORTH EASTERN MARINE (SUNDERLAND) LTD.

RICHARDSONS WESTGARTH (HARTLEPOOL) LTD.

THE HUMBER GRAVING DOCK & ENGINEERING CO. LTD.

RICHARDSONS WESTGARTH ATOMIC LTD.

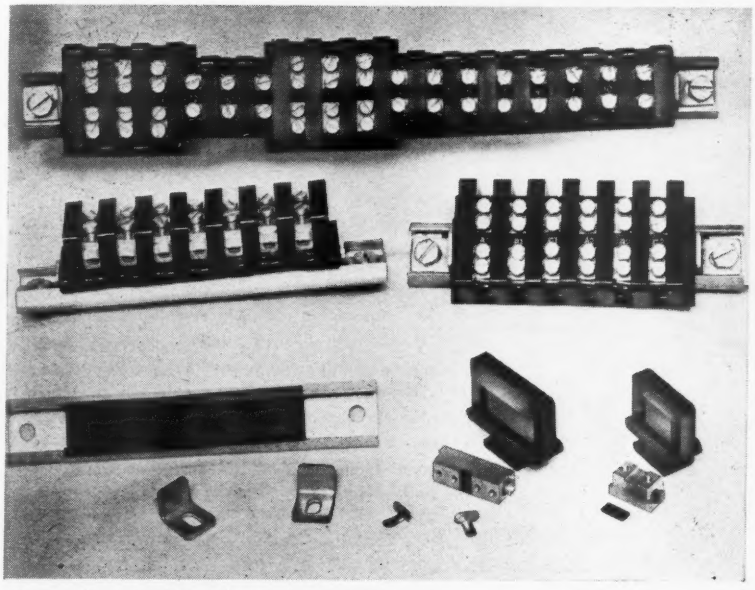
ASSOCIATED COMPANY : ATOMIC POWER CONSTRUCTIONS LTD.

RICHARDSONS, WESTGARTH & CO. LTD.

WALLSEND, NORTHUMBERLAND.

"Colne" CONNECTORS

25 AND 50 AMPERE CAPACITY



UNIT BUILD UP FROM 2 WAY TO 26 WAY STRIPS, IN EITHER 25 AMP, 50 AMP OR MIXED ASSEMBLIES.

COMPONENT PARTS SUPPLIED TO ENABLE CUSTOMERS TO BUILD UP THEIR OWN ASSEMBLIES.

Please send your enquiries to the Manufacturers :—

COLNE SWITCHGEAR (K & W) Ltd. · Walton Street · Colne · Lancashire

Formerly Electrical Products (Colne) Ltd.

TEL.: COLNE 1394/5

R & S Ltd.

INSULATING BEADS

Resistance Wires

7 Springfield Street Warrington
Warrington 34391/2

102 Abbey Street Accrington
Accrington 2774

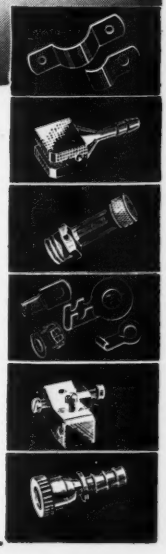
161/163 Eldon Street Preston
Preston 57975/6

Lionel Robinson & Co. Ltd.

4 Staple Inn London, W.C.1

Telephone - - HOLborn 6322

METAL PARTS



PAXTONS

REPETITION PARTS, MACHINING, SMALL CASTINGS, PRESSINGS, PIPE FITTINGS, CLIPS, TERMINALS, SOCKETS, UNIONS, SPRINGS, CONTACTS, EYELETS, LUBRICATORS, TAGS, NIPPLES, ADAPTORS, WING-NUTS, LUGS, CLEATS, FLEXIBLE CONNECTORS, SPECIAL WASHERS, COMPLETE ASSEMBLIES

In fact:—

Anything Small In Metal

FOR ANY TRADE

PAXTONS (ELECTRICAL) LTD.

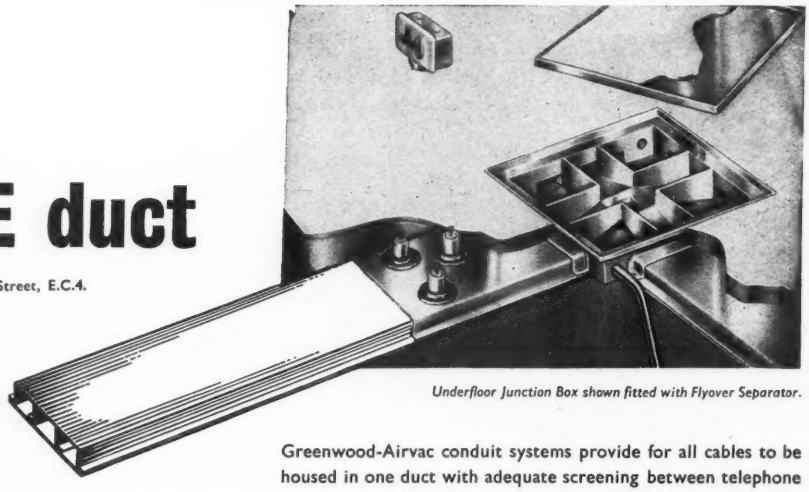
METAL PARTS SECTION

A.I.D. and A.R.B. approved

WESTON-SUPER-MARE

Phone: 1357 Grams: 1357

All cables in ONE duct



Underfloor Junction Box shown fitted with Flyover Separator.

Walbrook House, Cannon Street, E.C.4.

Another Greenwood-Airvac Conduit underfloor installation

Arch:—Henry Tanner Esq.
Cont:—F. G. Minter Ltd.
Elec. Contractors:—Berkeley Electrical Eng. Co. Ltd.

Greenwood-Airvac conduit systems provide for all cables to be housed in one duct with adequate screening between telephone and power cables. The unique construction of the underfloor system enables it to be laid where necessary in only 1½" of screed, and for applications where underfloor fitting is impracticable, a skirting system is readily available. Please write or telephone for the publication 'Greenwood-Airvac Conduit Systems' or call to see the demonstration layout in the Beacon House showroom.

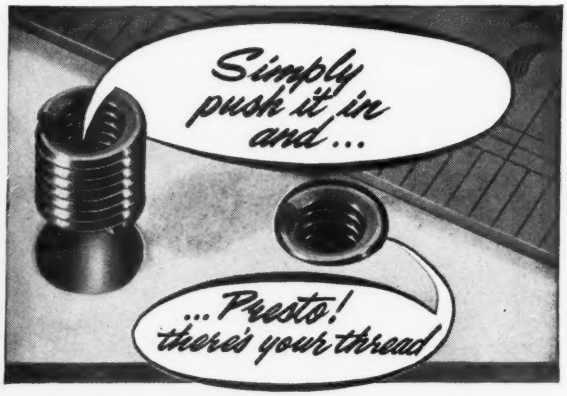
Greenwood-Airvac *conduit systems*

GREENWOOD'S AND AIRVAC VENTILATING COMPANY LTD
Patentees, Designers and Manufacturers of Ventilating Equipment and Electrical Conduit Systems
BEACON HOUSE, KINGSWAY, LONDON, W.C.2. CHAncery 8135/6/7. 'Airvac', London

Ratcliffe
SPRINGS

J. S. Ratcliffe
(ROCHDALE)
LIMITED
CRAWFORD SPRING WORKS
NORMAN RD — ROCHDALE
Phone: 4692/3/4. Grams: Recoil, Rochdale

Ratcliffe Springs never lose their temper!



HELI-COIL REGD. TRADE MARK
PUSH-TYPE INSERTS
THE READY-MADE THREAD FOR MOULDED MATERIALS

Eliminate the need for solid bushing and tapping, use a HELI-COIL PUSH-TYPE INSERT the ready-made screw thread for moulded and plastic parts, die cast alloys, powdered metals, all soft light materials and many hard metals. Pushed directly in drilled cast, or moulded, blind or through holes, this is the ideal low-cost, volume production, fastening method. A few shillings in tooling is all you need for up to 1,200 holes and more per hour.

For faster, cheaper production

Write for details to:
ARMSTRONG PATENTS CO. LTD. BEVERLEY, YORKSHIRE

BAP 8

DIRECT CURRENT

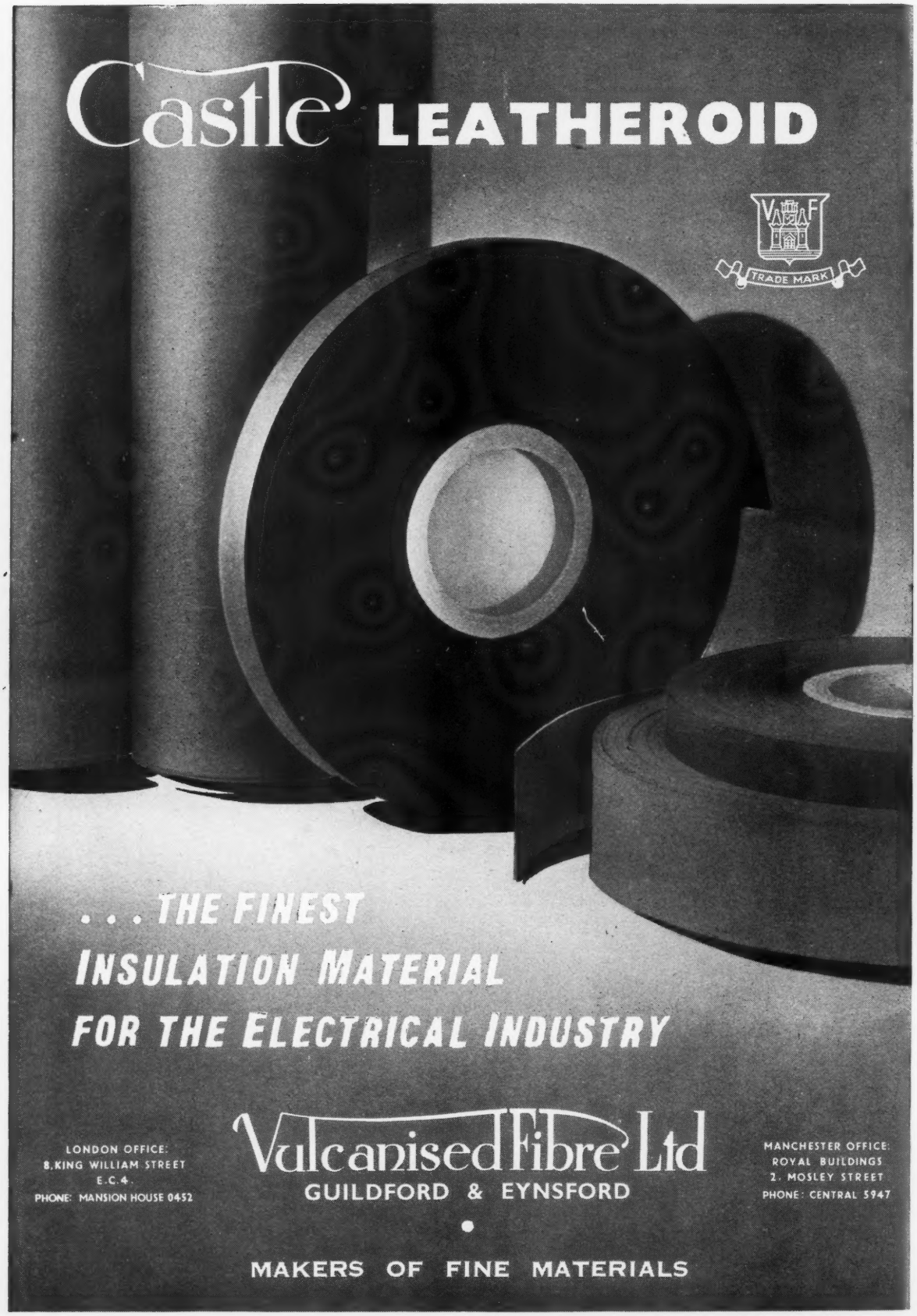
from a.c. mains

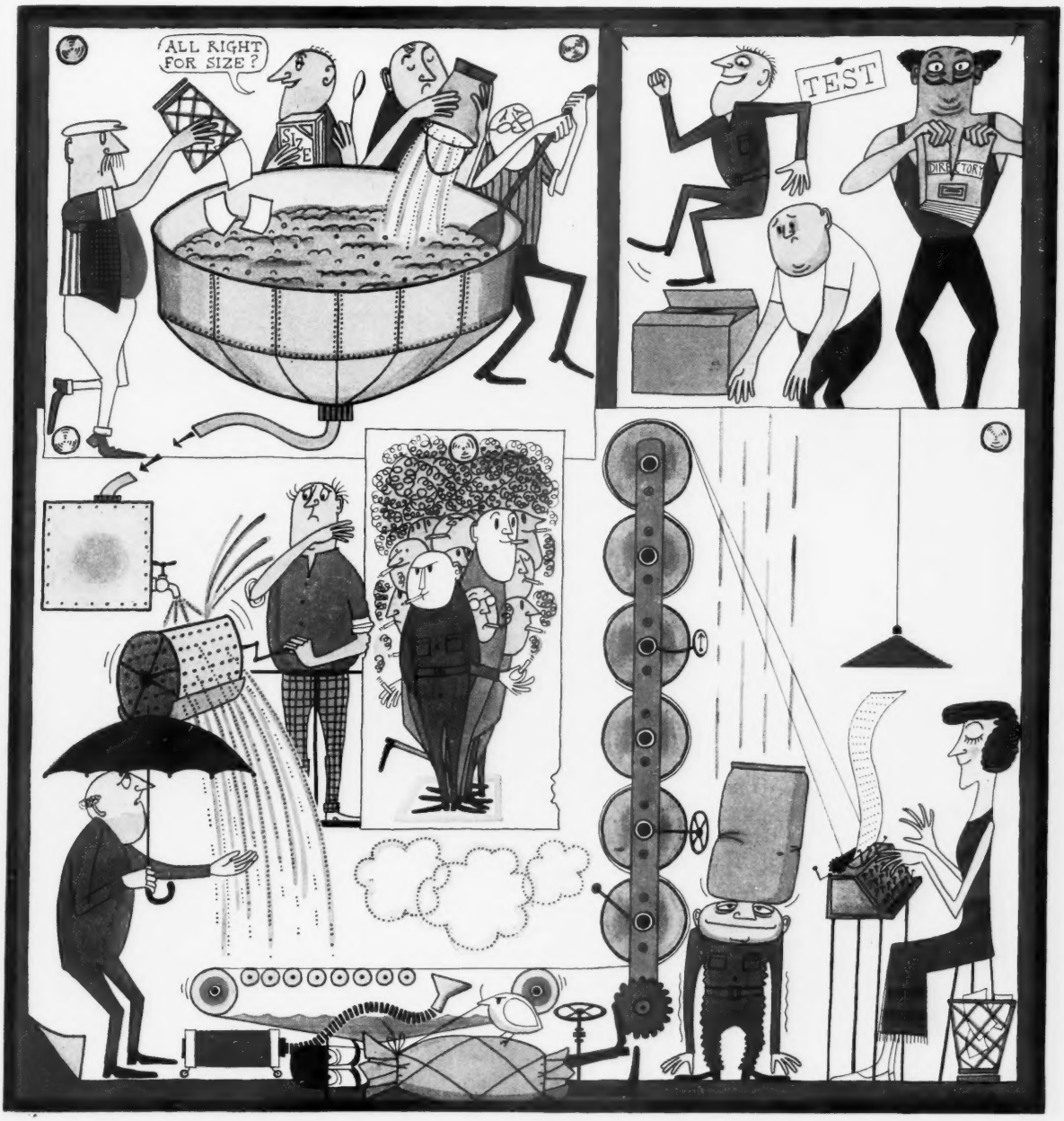
GERMANIUM rectifier equipments can now be offered for a.c./d.c. conversion where the superior efficiency and reduced bulk offer advantages for d.c. outputs above 25 kW.

WESTINGHOUSE offer this new rectifier to the Electrical Industry backed by thirty years' experience with copper oxide, selenium and new germanium rectifiers.

Details of germanium rectifier equipments from:—

Westinghouse Brake & Signal Co. Ltd.
(Dept. E.R.29)
82 York Way, King's Cross, London N.1
Tel.: TERminus 6432


Castle LEATHEROID
V F
TRADE MARK
. . . THE FINEST
INSULATION MATERIAL
FOR THE ELECTRICAL INDUSTRY
LONDON OFFICE:
8, KING WILLIAM STREET
E.C.4.
PHONE: MANSION HOUSE 0452
Vulcanised Fibre Ltd
GUILDFORD & EYNSFORD
MANCHESTER OFFICE:
ROYAL BUILDINGS
2, MOSLEY STREET
PHONE: CENTRAL 5947
MAKERS OF FINE MATERIALS



Oiling the wheels of industry—

PAPER MAKING

For every modern industrial process there is a specialised grade of Sea Shell Lubricant.

SHELL leadership in lubrication

Copies of this advertisement (in colour) can be obtained from Shell-Mex and B.P. Ltd.

G.E.C.

medium voltage switch and fuse gear

MW switchgear
for general industrial applications

HW switchgear
for heavy industry and exposed situations

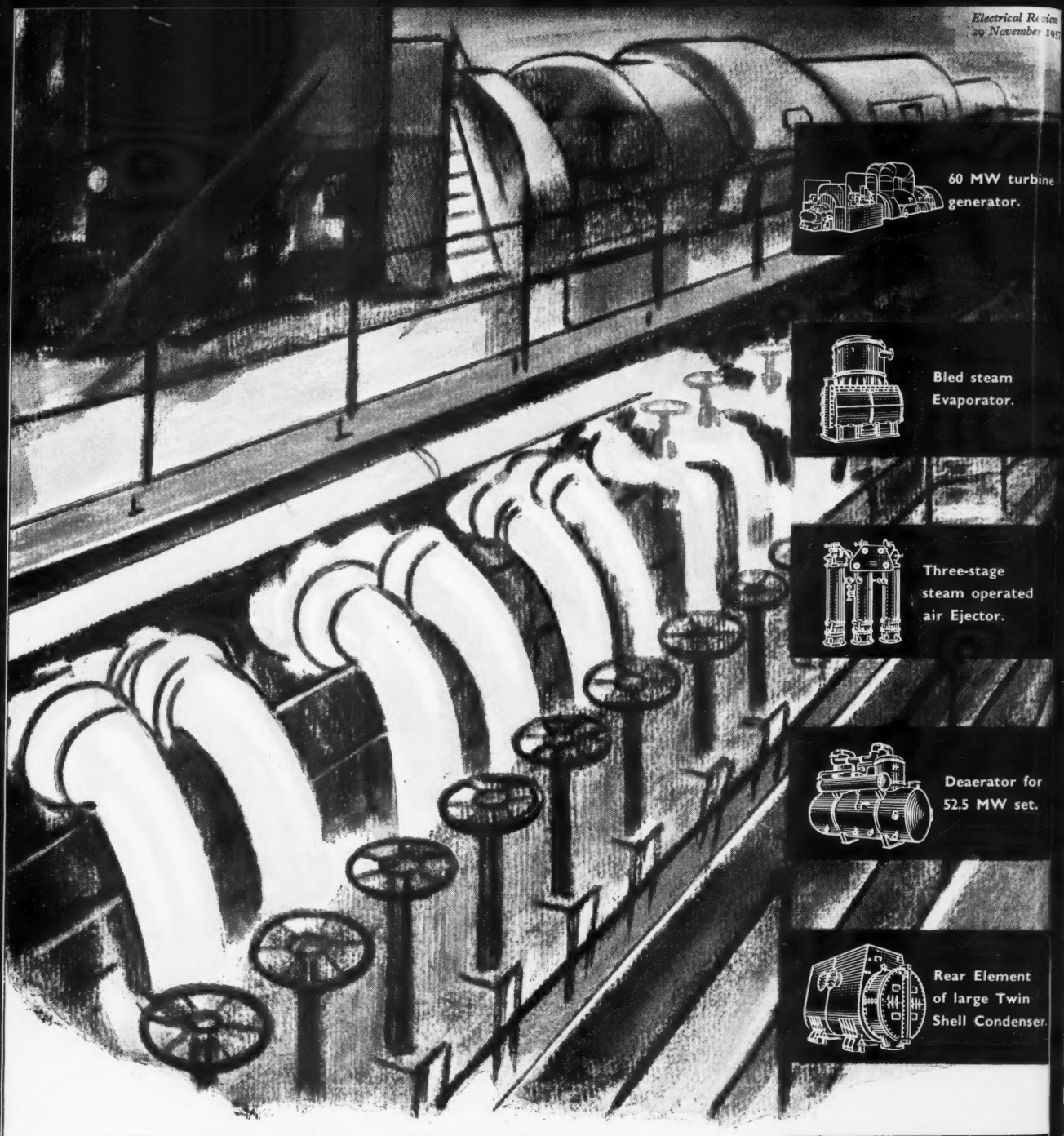
DW switchgear
for domestic installations

G.E.C.

H.R.C. FUSE LINKS

INDUSTRIAL

Send for Publication X3730, a handy pocket-size guide to the selection of Industrial Cartridge Fuses.



60 MW turbine generator.

Bled steam Evaporator.

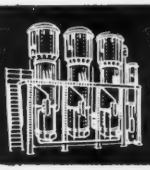
Three-stage steam operated air Ejector.

Deaerator for 52.5 MW set.

Rear Element of large Twin Shell Condenser.

TURBINE FEED HEATERS for regenerative feed water heating were introduced by Metropolitan-Vickers in 1916, and more than one thousand have since been put into service by the Company, with power station plant in many parts of the world.

The bled steam feed-water heater is but one item in the comprehensive range of heat exchange apparatus manufactured by Metropolitan-Vickers for all types of thermal power plant.



Thermo-compressor type Evaporator.

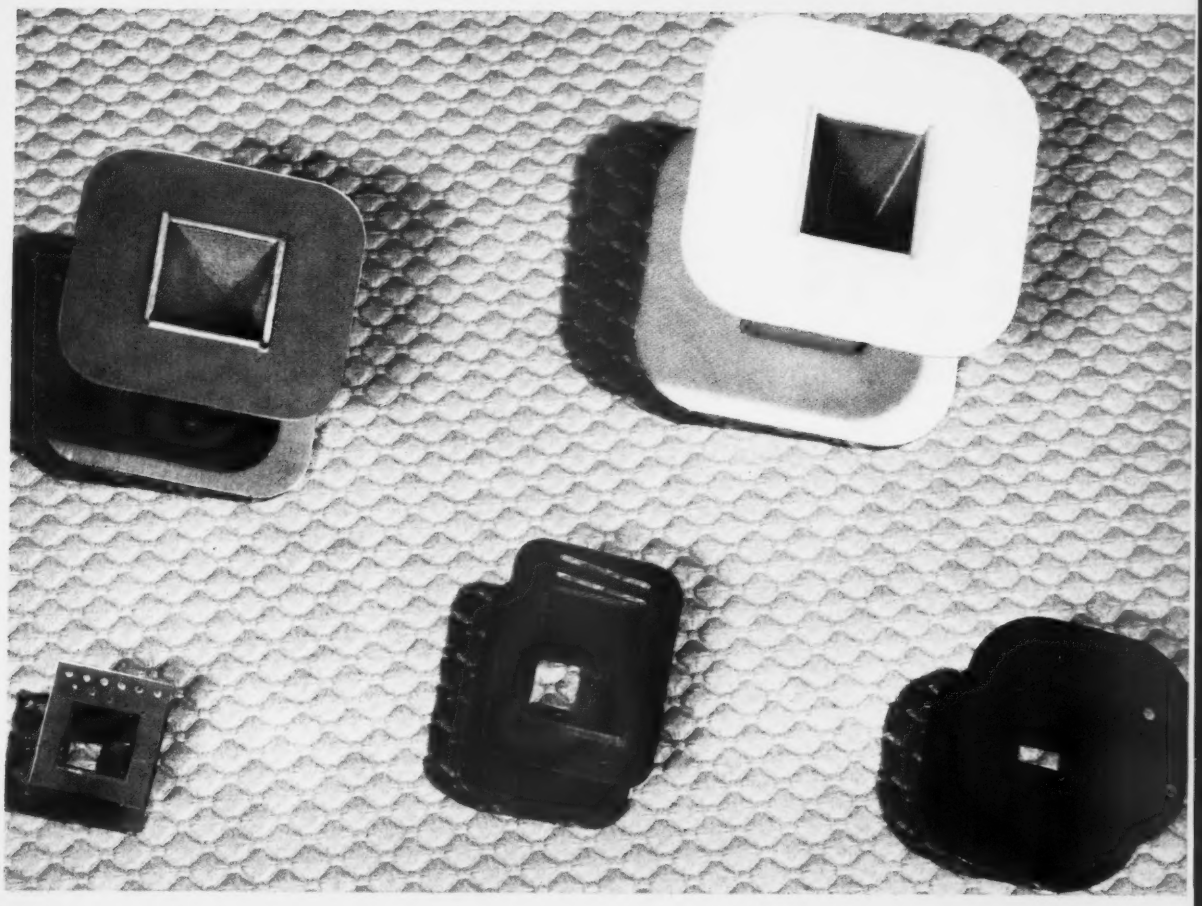
Motor-Compressor intercooler.

METROPOLITAN-VICKERS

ELECTRICAL CO LTD · TRAFFORD PARK · MANCHESTER, 17

B/A 603

ELECTRICAL INSULATION



We offer a standard range of Bobbins for all "C" core and other laminations and rapid delivery can usually be given from stock.

Our new booklet—LANTEX TRANSFORMER BOBBINS—gives full details and dimensions of our range, and includes a most useful table of lamination equivalents.

We shall be glad to send a copy free on request.

LANGLEY LONDON LIMITED

KELVIN WAY, CRAWLEY, SUSSEX

Telephone: CRAWLEY 681 (3 lines)

G.E.C.
NEW
G.E.C.
range of unit heaters
3 kW
5 kW
10 kW
15 & 20 kW

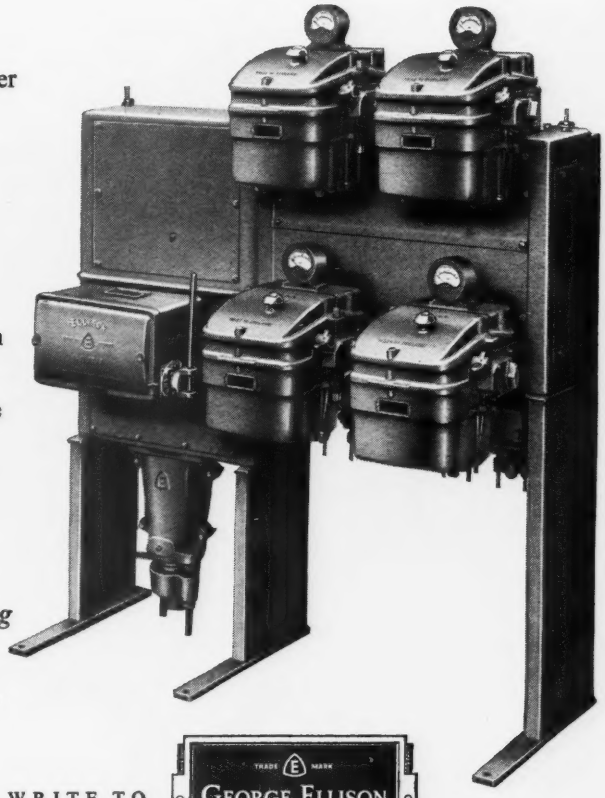
Ellison 20 amp. Circuit Breaker

For Group Mounting and Sequence Starting of electric motors

The "Ellison" 20 amp. direct-to-line starter can readily be mounted in groups on a busbar chamber. Cable entry may be direct to the busbars by way of a cable fitting or through an isolator or automatic circuit breaker. Extensions are easily made.

This A.S.T.A. tested gear has a built-in isolator in which H.R.C. fuses may be included. Auxiliary switches may also be incorporated for sequence starting. Robust contacts ensure long life under direct-to-line starting conditions.

With reliable quick-resetting protective devices and safety interlocks



FOR FURTHER INFORMATION WRITE TO

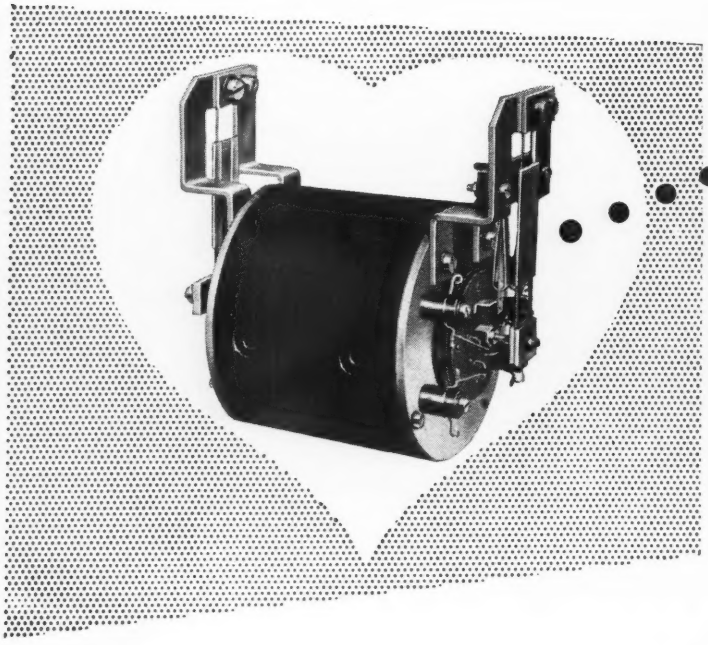
TRADE (E) MARK
GEORGE ELLISON
LIMITED
BIRMINGHAM ENGLAND

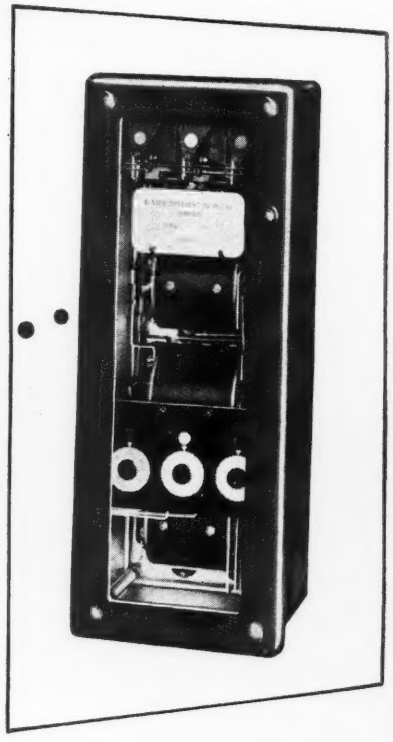
YOU CAN RELY ON AN ELLISON PRODUCT

739

D

The STABILAY *—the heart of high-speed protection*





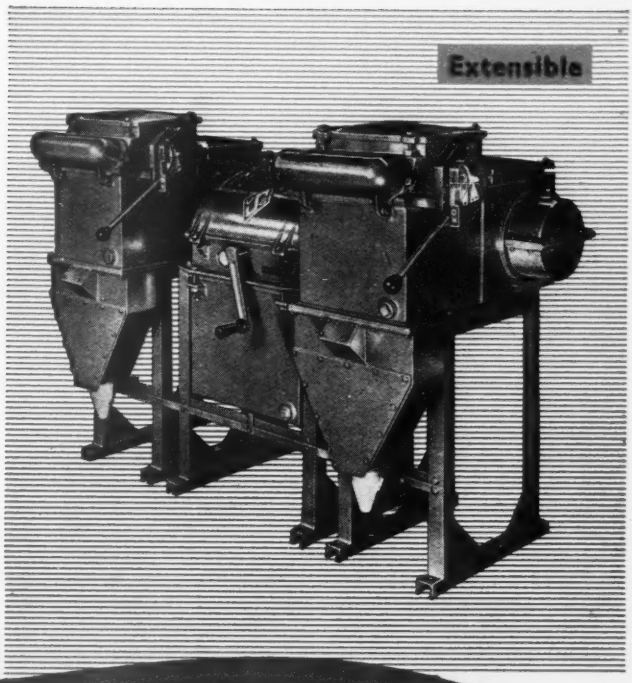
- Rapid operation
- High sensitivity with low coil impedance
- High ratio of overload capacity to minimum setting
- Linear differential characteristics
- Unaffected by vibration

STABILAY permanent-magnet moving-coil relays are available for the overall biased differential protection of generators, power transformers, feeders and busbars, and for the definite impedance scheme of protection for feeders. Metrovick technical service on all protective gear problems remains unsurpassed.

METROPOLITAN-VICKERS
ELECTRICAL CO LTD · TRAFFORD PARK · MANCHESTER, 17

An A.E.I. Company

Safeguarding Electrical Equipment



RING MAIN TEE-OFF

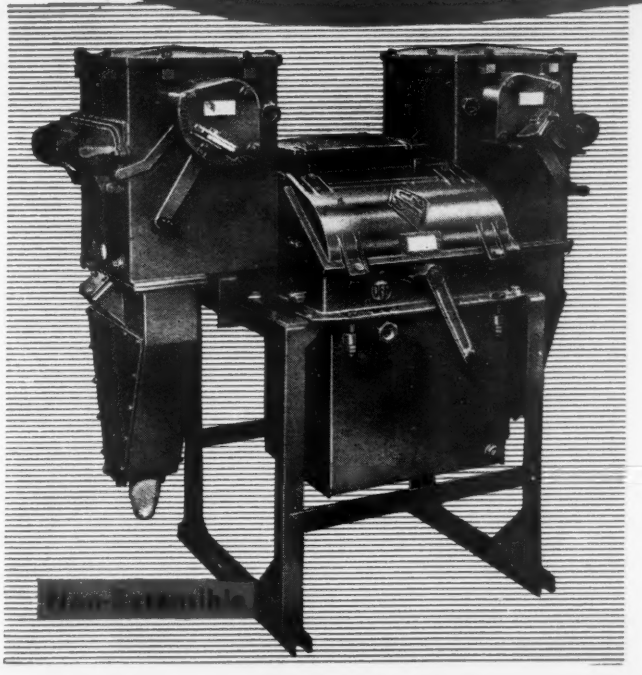
Rupturing capacity 250 MVA ASTA. Tested at both 6.6. and 11 kV with fault making load breaking Isolators.

Impulse tested

Rust proof finish if required for outdoor installation.

Many different arrangements available including transformer mounting and for incorporation in switchboards with Oil Circuit Breaker Units.

H.V. FUSE SWITCH EQUIPMENT



The following can be fitted if required:

Spare fuse container. Ammeter. Potential indicator. Shunt trip. Earth Leakage trip. Earthing and/or testing device for Fuse Switch. Metering Unit with Voltage and current transformers.

Leaflets Nos. 555 and 556 available to bona-fide applicants.

Switchgear by

STATTER

Member of Lancashire Dynamo Group

Specialists in Switchgear for over 50 Years

J. G. STATTER & CO. LTD.

82 VICTORIA ST LONDON SWI

raw power — refined control

old Faithful, most famous of the geysers at Yellowstone Park. Such phenomena are within the scope of the observations of scientists of more than 50 nations throughout the International Geophysical Year. Photograph by courtesy of United States Information Service

one side of the picture — the raw, natural power; unharnessed, uncontrolled

and the other side? Simplex switchgear. Reliable and protective. The means by which raw power is controlled, directed, channelled. An ideal means, because Simplex take a workmanlike view of switchgear: use the best of the most suitable materials and methods. Produce a job that looks as good as it is. And above all — Simplex design for the man on the job — plan for utmost ease in installation, maintenance and adaption

Simplex Switchboard designed to the requirements of the Chief Engineer, Ministry of Works for the Atomic Research Establishment at Harwell. Installed in the form of a curve to fit inside the outer steel shell of reactor 'Pluto', this switchgear controls the main auxiliary circuits associated with the reactor

it's the installed cost that counts!

cut costs and specify

switch and fuse gear by

Simplex

Simplex Electric Co Ltd Oldbury Birmingham

Branches throughout Britain and agents throughout the world

A GEC COMPANY

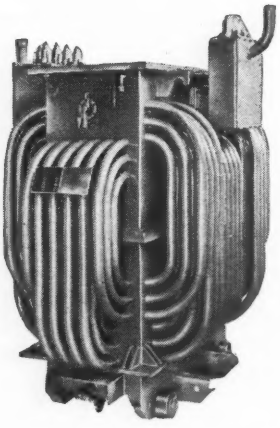
THE NELSON ENGINEERING CO. LTD.

specialized products for industry

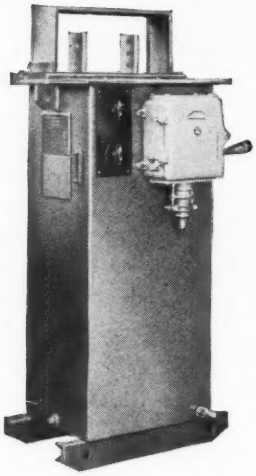
In addition to standard products, the Nelson Engineering Co. Ltd. manufacture specialized products for a wide range of manufacturing industries.
These products include special transformers, motors, control equipment, etc.

for

Power Stations, Paper Mills, The Textile Industry, Chemical Plants, Steel Works, Cycle Manufacturers, Machine Tools, Oil Installations, etc.
Other users include :— Food Manufacture and Processing, Gas Undertakings, Electricity Boards and the Mining Industry



Power Transformers up to 1,000 kVA



Special types for Industrial Applications

Equipment supplied includes :—

- Ward Leonard Equipment
- Special Rectifier Sets
- Battery Charging Equipment
- Induction Heating Transformers
- Welding Transformers
- Motors for special applications
- Voltage Regulating Equipment

THE NELSON ENGINEERING CO. LTD.
NELSON • LANCASHIRE

Telephone: Nelson 1545-6 *Telegrams: Nelson 1545*

LONDON OFFICE: 249 GRAND BUILDINGS, LONDON, W.C.2

Telephone: Trafalgar 4565/6

"When Irish Eyes are Smiling
Sure it's like a morn in Spring"—

No one disputes the words of this song and we are confident no one will dispute that:—

THE PERFECT CABLE
is the right ***CABLE*** *and*
PERFECT CABLES *are made by*

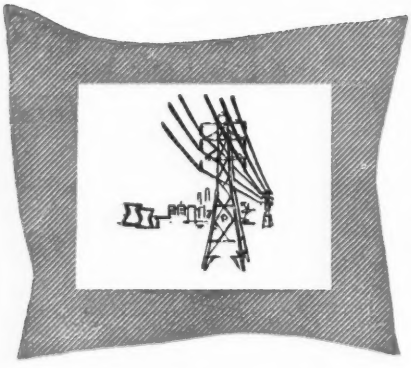
IRISH CABLES LTD

NEWCASTLE · Co. DOWN · N. IRELAND

London Office:
19/21 FITZROY STREET, LONDON, W.1
Telephone: LANgham 8317/9

Belfast Office:
2a, HARTINGTON ST., BELFAST, Northern Ireland
Telephone: Belfast 27922/3

Everyone knows . . .



SPENCER WIRE *gets around*

Spencer's Copper Strand, All Aluminium, and Steel Cored Aluminium Conductors are being used for the carrying of electricity on overhead transmission lines and in many electrification schemes at present being undertaken in the United Kingdom. Spencers also manufacture Copper and Aluminium wire for cables, transformers, motors and the Electrical trade generally.

Spencers OF WAKEFIELD

THE SPENCER WIRE COMPANY LIMITED · WAKEFIELD

Telephone: Wakefield 6111 (10 lines). Telegrams: Spencer, Wakefield, Telex. Telex No. 55.160

DaW625

Every Monday morning the Delanco team get their playing orders for the week. *The aim?—to be top of the league for service, to make* every point tell in the interests of the customer.

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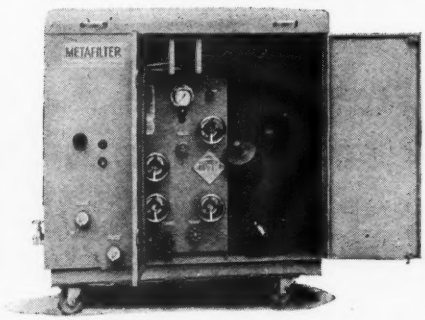

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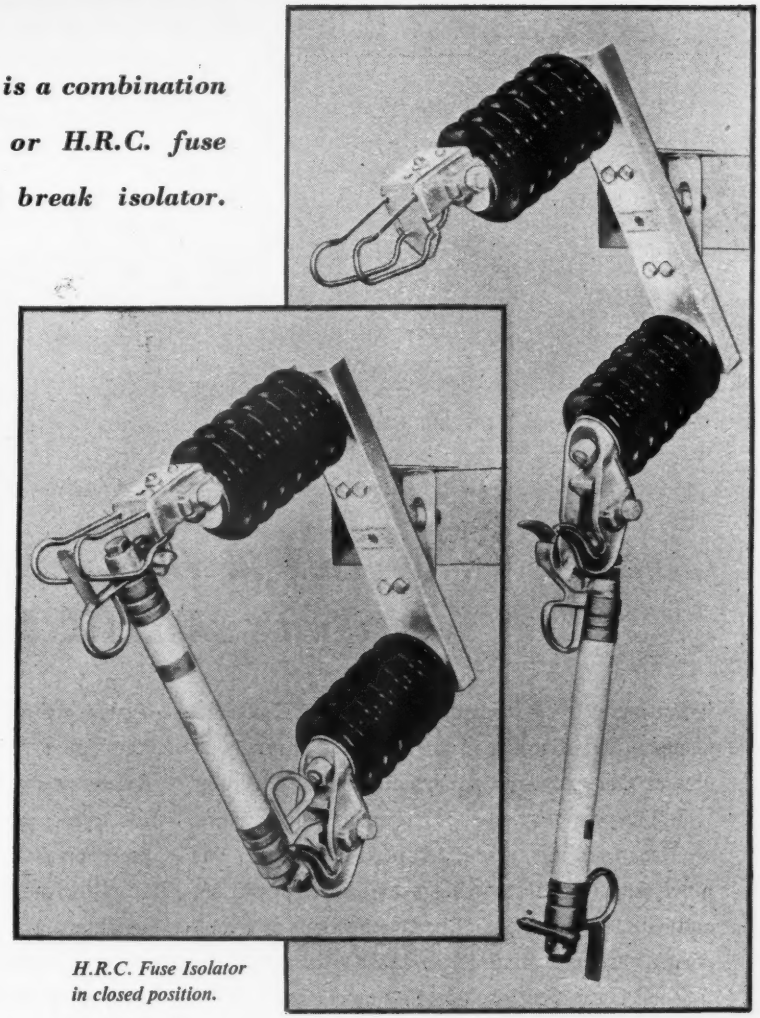

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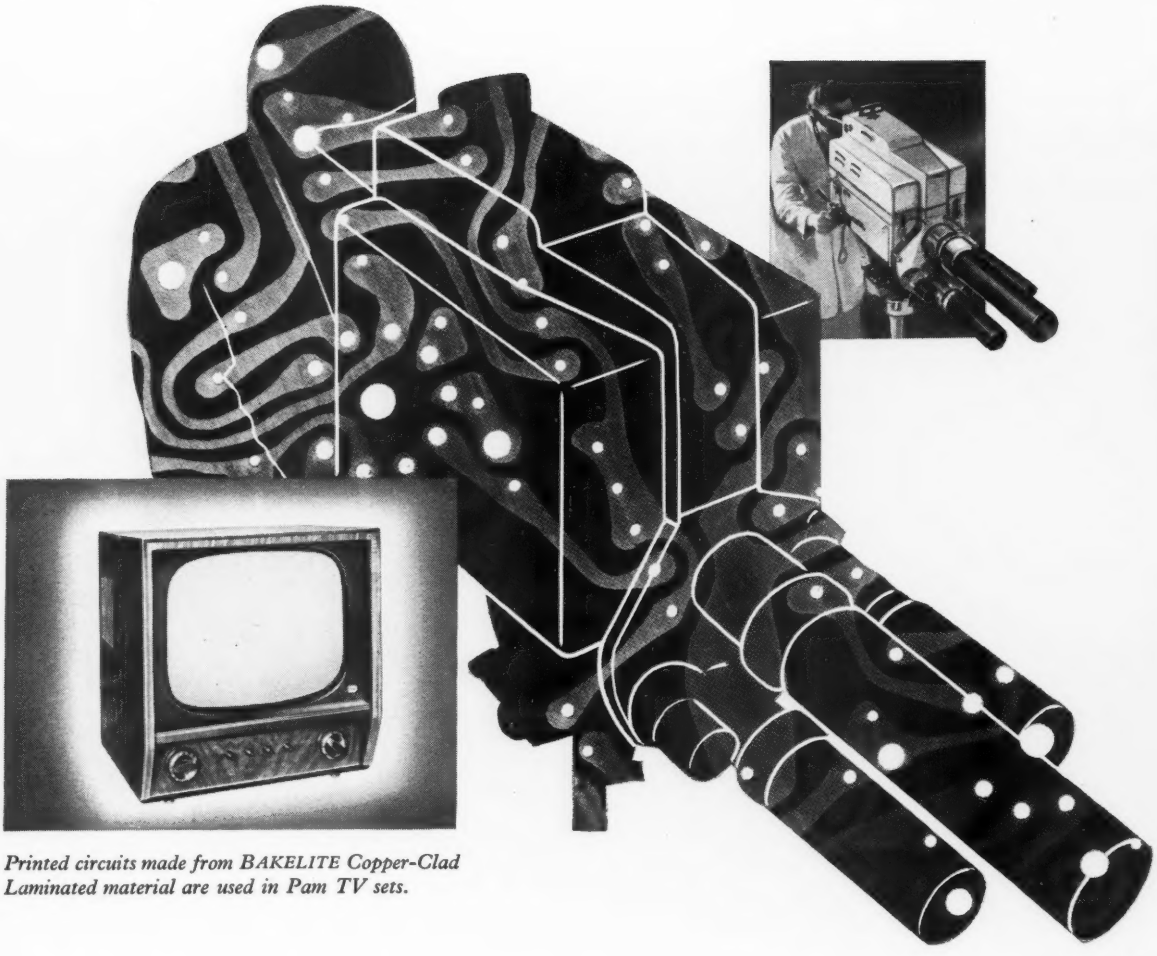

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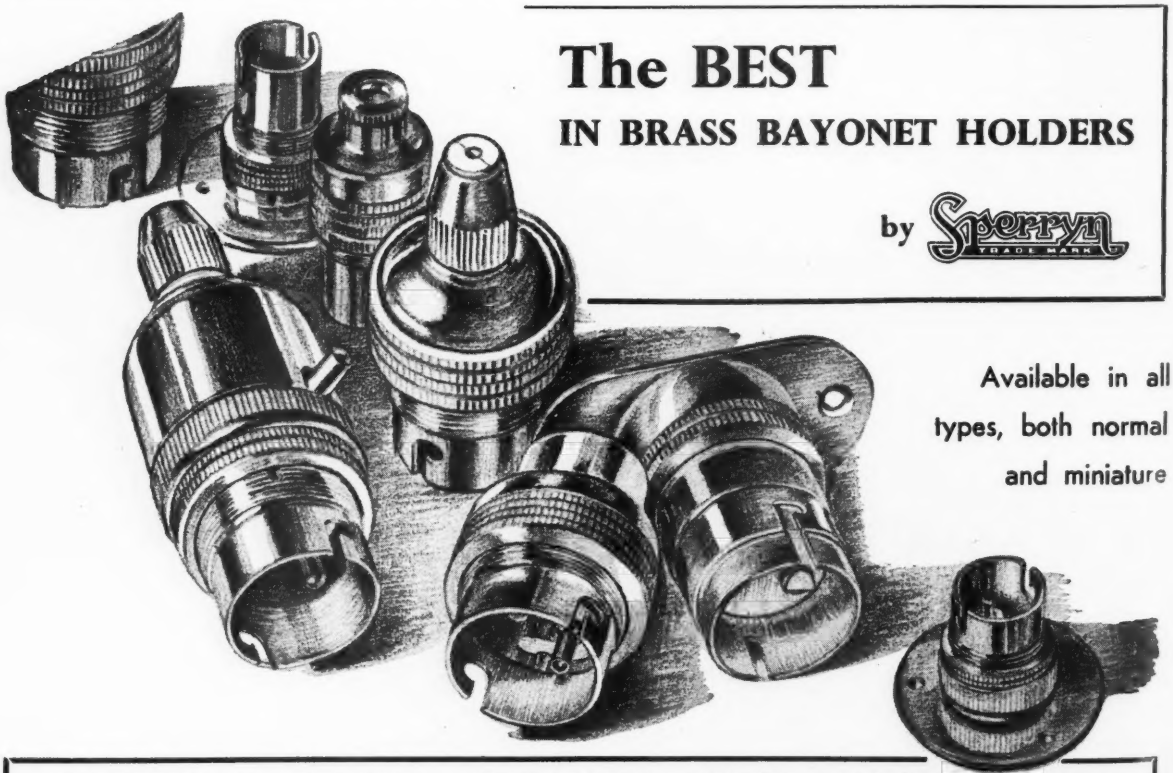

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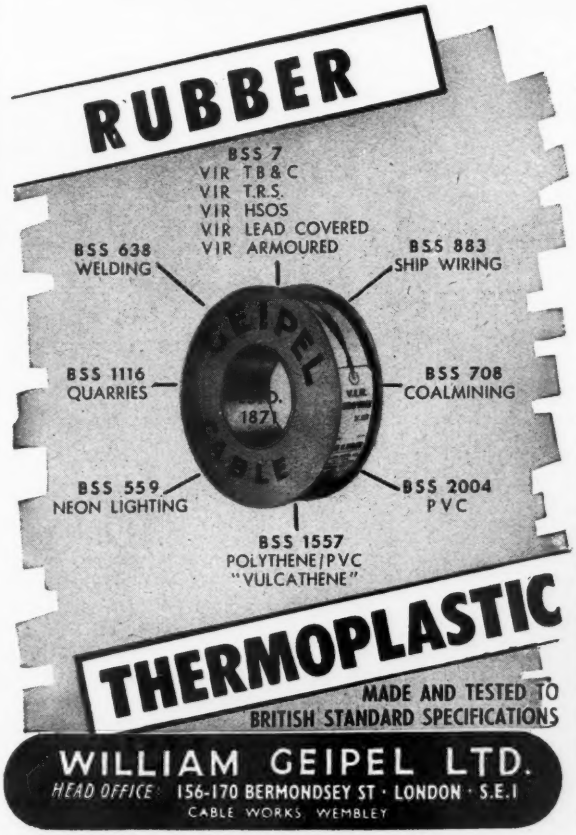

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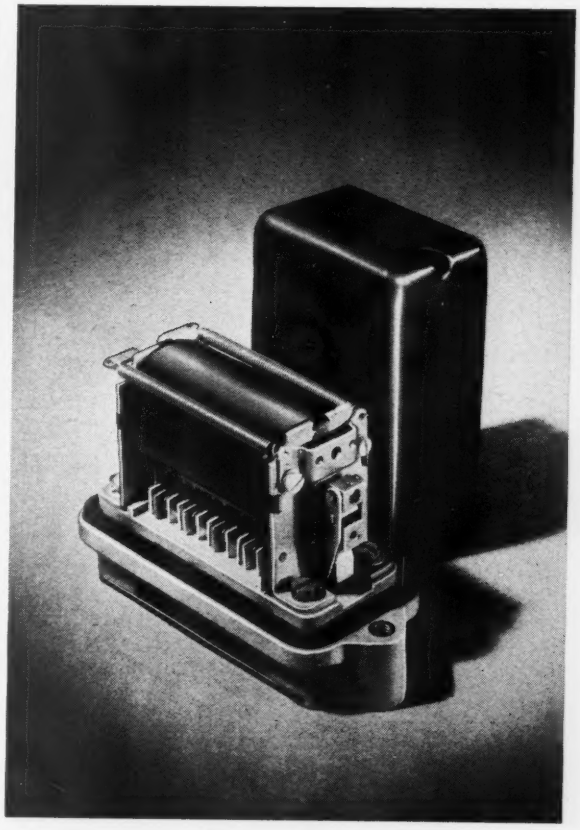

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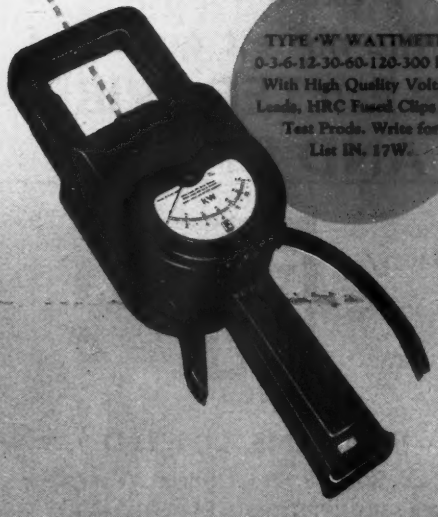

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29 NOVEMBER 1957

ELECTRICAL REVIEW

Managing Editor: HUGH S. POCOCK, M.I.E.E. *General Editor:* J. H. COSENS *Technical Editor:* P. W. TUCKER, M.I.E.E.

In This Issue

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Power Transformer Production	965	A new £3 million transformer factory built by the Metropolitan-Vickers Electrical Co., Ltd., at Wythenshawe, was officially opened on Friday last by the Duke of Edinburgh
Electrifying the Railways	969	In this year's Faraday Lecture, delivered for the first time at Newcastle-upon-Tyne last week, Mr. G. H. Fletcher discusses the proposed electrification of 1,210 miles of main-line and suburban railways in Great Britain
Electrical Power Engineers	979	At the annual dinner of the E.P.E.A. on Friday the principal guest was Sir Henry Self, chairman of the new Electricity Council
Overseas Electrical Trade	985	The value of British electrical exports in October of £17¾ million was nearly £1½ million below the total for the corresponding month of last year
Traction Motor Production	987	Traction motors and generators hitherto manufactured at the G.E.C.'s Witton Works are now produced at a specialist factory at Dudley Port. The present capacity for about £1 million of equipment a year is expected eventually to be doubled
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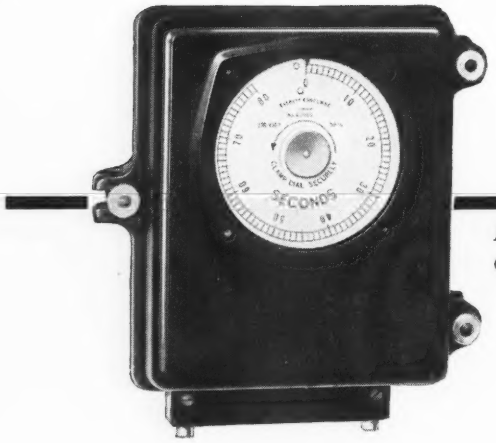

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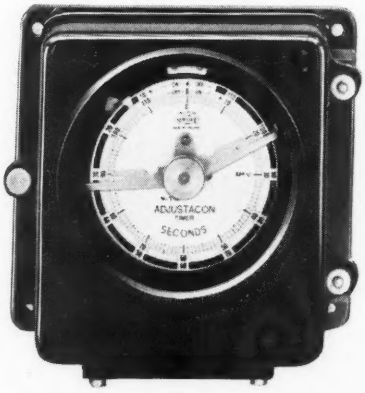

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ELECTRICAL REVIEW

29 November 1957 Vol. 161 No. 22 Established 1872

Modernising Britain's Railways

THE substantial economies and other advantages to be expected from the British Transport Commission's plans for railway electrification raise two main questions. These questions are of interest also to the wider non-technical audience to which Mr. G. H. Fletcher's Faraday Lecture was designed in part to appeal. The first is why, these advantages having been known in a general way since the publication of the Weir Report in 1931, so little has been done to implement its recommendations. The second question is why the d.c. system, settled as standard a few years earlier, has now been replaced apparently by a usually so-called single-phase a.c. system.

Delay in bringing traction practice into line with modern requirements is no doubt an instance of how often the good may be an enemy of the best. The pioneering of steam traction in this country created a tradition for building locomotives that received world recognition as of the highest class. Coal of the high grade required was plentiful at a relatively low price and suitable operating labour was readily available. There was formerly not the same appreciation of the importance of smokeless atmospheres and hence less public objection to noxious discharges from short locomotive chimneys.

Such considerations as these resulted in reluctance to face the need for major changes beyond those entailed by the immediately obvious one of electrifying urban and suburban lines. The chief economic factor, however, arises out of the great advances in electro-technology during the last few years, particularly in reducing the weight and bulk of apparatus and in improving the heat-resisting qualities of insulating materials. This makes possible the installation of transformers and rectifiers on the train itself instead of, as formerly, placing them alongside the railway with a consequent better utility factor of the apparatus and the advantage of distribution from fewer grid substations at a much higher voltage.

An important point is the retention of the well tried d.c. traction motor—a feature that seems liable to be obscured by common references to the new standard as a single-phase a.c. system. Single-phase motors used in some cases abroad have been found to be markedly inferior to d.c. motors for the purpose, even at lower frequencies than the 50 c/s of the grid, the source of unconverted supply in both British methods. The change of standard for further developments cannot be construed as reflecting adversely on existing methods, which represented the most practicable way of dealing with the high traffic densities of the earlier examples.

The substantial scheme now in hand is only a first instalment and will no doubt be extended, as its success is demonstrated, until most of Britain's railways have been electrified.

CANADA WANTS TO BUY

What must be one of the largest and most representative trade missions ever to visit this country arrived here last week from Canada. The party of over fifty is under the leadership of the Canadian Minister of Trade and Commerce, the Hon. Gordon Churchill, and the chairman of the Hydro-Electric Power Commission of Ontario, Mr. J. S. Duncan. Visits are to be paid by members of the Mission to a variety of industrial establishments; there appears to be a preponderance of engineering works in the itinerary, including quite a few electrical engineering concerns.

The Mission's object is one-sided—and for once this is to our advantage. It is not here to sell Canadian goods but to discover how Canada's imports from this country can be increased. Since Canada has a very favourable balance with the United Kingdom it is felt that the diversion of purchases from the United States, with whom Canada is in deficit, is economically necessary. There may not be immediate orders (the visit is primarily exploratory) but it is hoped that results will be visible next year and thereafter.

ELECTRICAL PROSPECTS

An added electrical significance is given to the Canadian Mission's visit by the fact that Mr. Duncan is the vice-chairman. Mr. Duncan was interviewed at a Press conference last week and made some encouraging statements. He said that British electrical manufacturers had already shown their ability to meet Canadian requirements and stood a good chance of securing some of the £17 million of generating plant contracts which would probably be placed during the next three or four years.

As the motive behind the visit is the transference of orders from the United States to other suppliers British manufacturers will be expected to follow American practice to some extent, or at least they must be prepared to meet Canadian requirements which have been " conditioned " by close contact with the United States. Apart from this, Mr. Duncan stressed the importance of shorter delivery periods, even suggesting that Canada might be given special attention in this direction.

PRICE OF COPPER

The effects of the drastic slump in the price of copper are still being felt in the industry, and particularly the cable section. Johnson & Phillips have decided not to pay an interim dividend although the board says that the profit earned since June is larger than that of the preceding half-year.

Speaking as chairman of the Rhodesian Anglo-American group of copper producers recently Sir Ernest Oppenheimer (whose death in Johannesburg was reported this week) said that current prices were too low, through over-supply, but he believed that copper would soon find ready markets at better prices. He did not consider that restriction of output was a sound policy, although, in fact, his group had voluntarily cut production by 10 per cent. On the other hand, Sir Ronald Prain, chairman of the Rhodesian Selection Trust, has said that he thinks that voluntary restriction of output, rather than any marketing policy, offers the best prospect of stabilised prices. While the electrical industry may ordinarily benefit from low copper prices, its experience during the past year or so has proved that stabilisation of price, at whatever level, is more important.

NUCLEAR PLANT FOR ITALY

The news that an Italian Government-controlled Corporation intends to order a " Calder Hall " type nuclear power station from the Nuclear Power Plant Co., Ltd., marks another historic step in this country's development of atomic energy. The contract will be the first export order of its kind; the Japanese, who have been negotiating for an atomic power station, have not yet come to a firm decision.

It is reported by the Rome correspondent of *The Times* that the Italian decision was taken in the face of pressure in favour of looking to the United States for this station. Another nuclear power station is contemplated for Southern Italy and invitations to tender have been sent out to " various countries," including Great Britain.

A noteworthy feature of the station to be supplied to Italy is that it will provide 200 MW from a reactor basically of the same design as the two 150 MW reactors in course of erection at Bradwell, Essex, for the Central Electricity Authority.

IMPORT DUTIES PROPOSALS

All those who are concerned with import trade will be pleased to know that the Government (as foreshadowed in the Queen's Speech) is to introduce a measure codifying and simplifying import duties. At present import tariffs are governed by something like eighty pieces of legislation and so it is high time that the position was cleared up.

One important innovation which is contemplated is the adoption of the " Brussels nomenclature," the electrical part of which was the subject of an article in the *Electrical Review* of 25th January last. Another is the proposed establishment of an Import Duties Board to assist the Board of Trade by investigating applications for alterations in import duties; this body will be empowered to recommend the relief from duty of particular classes of goods or individual consignments.

THE COMMON CAUSE

The understanding of each other's broad points of view implicit in the speeches of Sir Henry Self and Mr. L. Benallick at the E.P.E.A. dinner, reported in this issue, was based on a common purpose. That purpose is to provide the most efficient and economical supply of electricity to consumers. Indeed, the good of the industry was made the first consideration when the Association was formed. Practical evidence of the realisation of this principle is found, for example, in its educational work, formation of technical groups and social functions. On the other hand it is clearly in the public interest that conditions of service should be such as to attract those whose ability and training have fitted them to cope with the continuous advances in technical aspects of all branches of the electricity supply industry.

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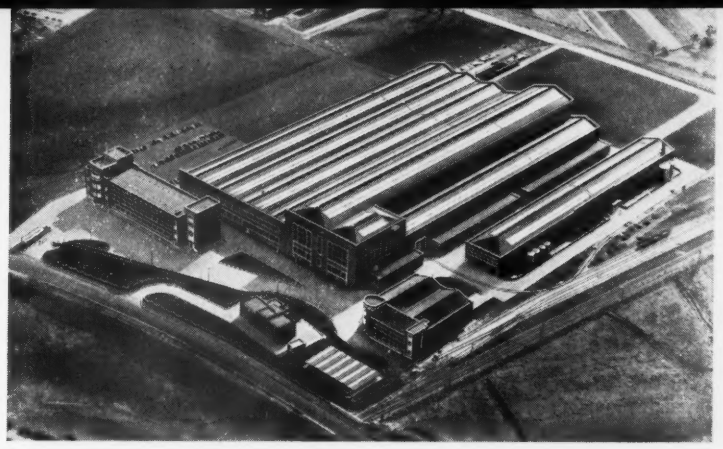


POWER TRANSFORMER PRODUCTION

SINCE the turn of the century the Metropolitan-Vickers Electrical Co., Ltd., has concentrated its transformer manufacturing capacity in the main works at Trafford Park, Manchester. In the years following the 1939-45 war, however, it became apparent that the existing facilities were inadequate for the increasing volume of business in this sphere. Accordingly, the decision was taken to build an entirely new factory at Wythenshawe laid out especially for the manufacture of transformers and associated equipment. This £3 million plant is now complete and in full operation, and on Friday last it was officially opened by the Duke of Edinburgh.

The Wythenshawe transformer factory forms part of a large expansion scheme initiated by Metropolitan-Vickers in 1953. This scheme provided for an increase of about 50 per cent in the facilities for building steam turbines, generators, other heavy rotating electrical machines, and switchgear at Trafford Park, and for moving the Transformer Department to Wythenshawe with a comparable increase in manufacturing capacity. Transformer manufacture was selected as being least dependent on the feeder department services in the main works.

The Wythenshawe works is designed as a self-contained factory to cover the manufacture of large h.v. power transformers, instrument transformers of all voltage classes for protection and measurement purposes and small transformers for industrial and electronics work. Additional products include on-load tap-changers and power rectifiers.

The works covers 28 acres of a 40-acre site leased from Manchester Corporation. The total floor area of the factory is 285,000 sq ft and, in addition, the offices and canteens cover 75,000 sq ft. There is provision on the site for factory and offices to be doubled in size, and the remaining space has been set aside for additions to the company's research facilities. These will include laboratories for work on nuclear metallurgy and e.h.v. testing.

Site clearance started in August, 1954; the main building was completed in December, 1956, and the offices, canteens and ancillary buildings six months later. Occupa-

Core preparation bay at the Metropolitan-Vickers Wythenshawe factory

tion began in May, 1956, and was largely completed by August last. At the present time the factory employs 1,250 people, of whom 210 are women; this total will rise to about 1,500 as the output increases. The works is unusually well situated for labour supply as it has easy rail and road services connections with residential areas containing 500,000 people, and it will have direct rail connection with Manchester overspill schemes in mid-Cheshire.

The factory provides for the manufacture of the largest sizes of transformer within the limitations of transport. It is equipped with cranes to lift 240 tons, and on the basis of present-day design could produce a group of three single-phase units with a combined rating of 600 MVA at 500 kV. Among the largest transformer ratings for which the company has orders at present are a 225 MVA three-phase generator transformer stepping up to 295 kV for the Central Electricity Authority, and two 150 MVA three-phase transformer groups for Yallourn, Australia, where the voltage is stepped up to 345 kV. About 30 per cent of the factory output will be for export.

The manufacturing shops are laid out in six bays 624ft long; the highest bay is 80ft to the crane rails. As the larger transformers cannot be considered in terms of mass production, the shop layout is designed to achieve maximum " production-flow " of individual orders.

The first stage in the manufacture of a transformer is core plate preparation and core building. In the core plate preparation bay the annealing and varnishing plants are of special interest. The annealing plants are of the batch type and are used for the stress relief of core plates made of cold rolled steel, employing cracked ammonia to give an inert atmosphere. The two varnishing plants are of the continuous conveyor belt type, and are used for core plate enamelling. Most of the transformers made by the company are of the core type, although some shell type units also are made. Cores are made at present from both hot rolled and cold rolled grain-oriented steel, but it is expected that more of the latter will be used as supplies increase.

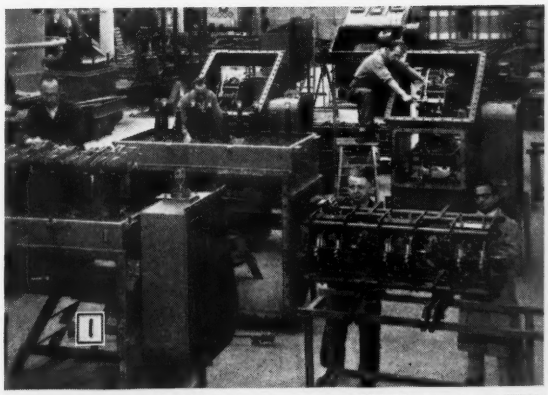
In the coil winding shop the largest winding machines, catering for the highest transformer ratings and voltage class so far envisaged, were designed and built in the company's own factory. Metal formers are used to ensure accuracy of dimensions; this is an important consideration in obtaining the balanced, rigid construction needed to withstand short-circuit stresses.

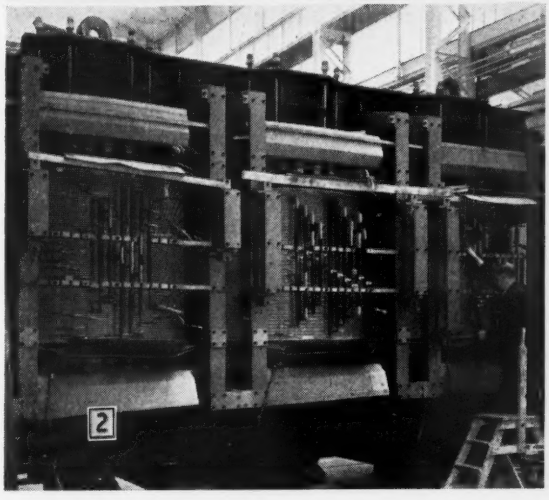
The company's range of on-load tap-changers extends from small units for use with transformers of 300 kVA capacity up to large units for h.v. transformers of up to 225 MVA for the 275 kV supergrid. The tap-changers are of the resistor transition type, ensuring minimum arcing at the divertor switch contacts. The patented operating mechanism incorporates a special follow-up device.

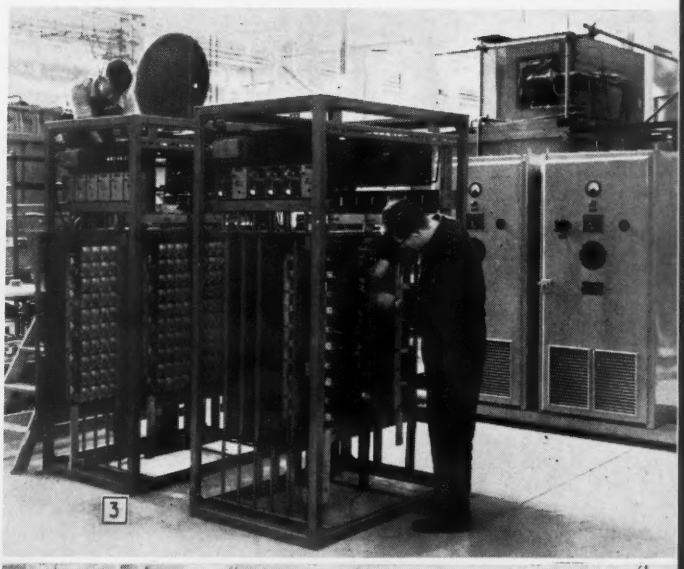
The instrument transformer manufacturing activities at Wythenshawe embrace current and voltage transformers of various voltages and methods of cooling, including 11 kV cast resin insulated current transformers, which are now in regular production. For the output stages of magnetic amplifiers, flux resetting transductors are rapidly replacing conventional types, and the company manufactures toroidal and spool-wound types for use in both open and closed loop servo schemes. Small power transformers and chokes of the hermetically sealed " C " core type are produced for use in electronic devices, as well as open type units complying with Inter-Service Specifications for the Ministry of Supply. Units are also supplied for incorporating in equipment manufactured by the other departments of the company.

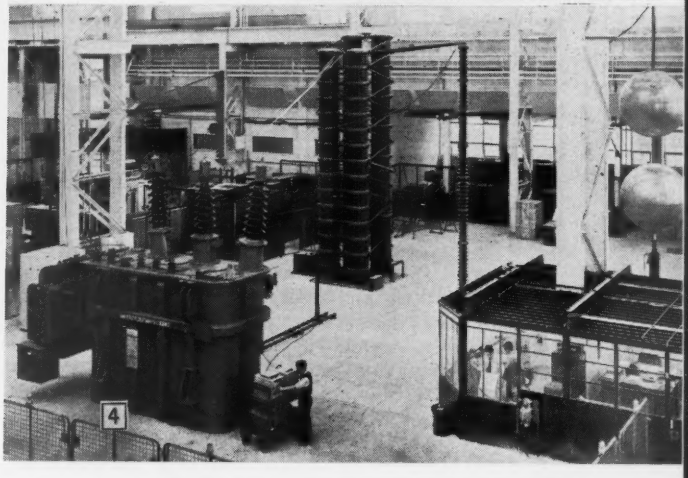
Glass bulb, steel tank and germanium power rectifier equipments are also built at Wythenshawe. Many of

1. *Steel fabrication bay.* **2.** *General view of coil winding bay*









1. On-load tap-changers being assembled. 2. Assembly of a 75 MVA transformer. 3. Two 500 kW 230 V d.c. germanium power rectifiers. 4. Transformer test area showing the 2·5 MV impulse generator

these are provided with grid control to give wide variation of d.c. voltage. To reduce handling to the minimum, equipment for shotblasting, atomic hydrogen welding, high vacuum pumping and leak detecting is available in the same bay, together with electrically heated ovens and bakeout plant.

The east end of the factory is almost entirely occupied by the various test departments. The layout is such that no work in progress, or work for dispatch, need be carried over any of the test areas. The test departments are supplied with power from a substation in a separate building at the north end of the factory, which houses eleven motor-generator sets, the largest having a capacity of 30 MVA. These test machines can be remotely controlled from the test rooms. Three separate test points are available in the power test section, enabling three transformers to be tested simultaneously.

A 2·5 MV fifteen-step impulse generator having a discharge energy of 67,000 joules is placed beside the main test area, together with a two-metre sphere gap and potential divider for impulse voltage measurement, cathode-ray oscillographs and a dark room. Other items of testing equipment are 650 kV and 750 kV single-phase 500 kVA testing transformers primarily used for transformer insulation and withstand tests.

Transformers under test, as well as the testing equipment, are controlled from a high gallery running the full length of the test area. The measuring instruments, selector panels and change-over cubicles are located on this gallery, and a further observation gallery runs at right angles.

The factory auxiliary services include compressed air supplied at a working pressure of 100 p.s.i. and piped oxygen and acetylene at pressures of 100 and 9 p.s.i. respectively. The capacities of the cranes vary from ten tons to 120 tons. Two 120 ton cranes are available in the large assembly bay for a combined lift of 240 tons. There are also a large number of power operated jib cranes. Heating in the factory is by hot water circulating under pressure in radiant heat panels, while the lighting is by a combination of fluorescent tubes and filament lamps.

E.W.F. Annual Meeting and Dinner

The annual general meeting of the Electrical Wholesalers' Federation will be held on 27th March next at the Dorchester Hotel, London, and will be followed in the evening (also at the Dorchester) by the annual dinner.

Earthing of Distribution Systems

THE discussion on the paper by Mr. F. Mather on the "Earthing of Low- and Medium-Voltage Distribution Systems and Equipment," which was presented on 20th November before the Supply Section of the Institution of Electrical Engineers and summarised by the author in the *Electrical Review* last week, was opened by Mr. H. W. Grimmitt (Ministry of Power). Systems of earthing, he said, had to be approved by the Minister with the concurrence of the Postmaster General. This was absolutely essential and it worked well. It had taken about six years to get the conditions into reasonable and practical shape, and this had been achieved largely as a result of the sympathetic intelligence with which the author had treated the regulations. In this country very few accidents were due to earthing, although electricity was now used in nearly twelve million houses. This did not mean that protective multiple earthing was not necessary or that the greatest care should not be exercised. It was due largely to sound workmanship and, if this good record was to be maintained, great care must be taken with special clamps, binding neutral conductors, seeing wire was put on carefully and so on. He thanked the North Western Electricity Board for their broadminded policy towards protective multiple earthing.

Mr. S. J. Emerson (Ministry of Labour and National Service, Factory Department) was convinced that danger from electricity had been overrated. The standard of installation in this country was second to none, and in accidents due to defective earthing connections last year, with one exception, protective multiple earthing would have footed the bill. At present, however, it did not comply with the spirit and the letter of the law, and more attention might have been given in the paper to other forms of protection, such as differential-current earth-leakage circuit-breakers. Wherever there was a break in a line some point in the system would be at a high voltage if the ratio of resistance of the two sections was great. In this connection the German arrangement was safer.

Mr. L. Gosland (E.R.A.) suggested that, while Mr. Mather had worked within the regulations, he had not been quite satisfied with their austerity. By the exercise of care and ingenuity, and perhaps the expenditure of a little more money than was strictly necessary, he had produced if not a luxury standard at least something approaching good middle-class quality. He asked whether the author thought the regulations should be tightened to defend the consumer who was content with austerity and was prepared to keep to the letter but not the spirit of the regulations.

Mr. H. C. S. Hayes (Post Office) explained how protective multiple earthing could affect Post Office circuits. So far no trouble had been experienced from noise which could be attributed to this system. In one area in Scotland where there was high earth resistivity there had been trouble with the tinkling of telephone bells due to leakage from consumers' apparatus. To avoid this the authority concerned had been asked to consider protective multiple earthing.

Mr. J. A. Robbins (Crabtree) said that shock risk might be stable despite the increasing use of electricity, but he thought officials were becoming worried about the fire risk associated with electrical faults. He believed earth-leakage associated with gas was a prolific cause of fires. This was of importance because protective multiple earthing was a system whereby, instead of trying to detect small faults and clear them in the incipient stage, one encouraged the flow of heavy fault current and adopted a system of protection that would not detect the high resistance class of fault. Secondly, he thought many of the advantages claimed for protective multiple earthing were common to any form of installation. Thirdly, he drew attention to the danger of shock as a result of unauthorised installations and alterations to installations by dabblers and "do-it-yourself" amateur handymen.

Mr. E. C. I. Macdonald pointed out that the paper was essentially one on rural earthing and did not relate to towns. He asked what success the North Western Electricity Board had had with fuse protection, particularly as heavy loadings were at present necessary in rural areas. In Scotland, where earthing was notoriously difficult, if there were ten or twelve poles on a given p.m.e. installation, the provision of butt earths gave the necessary resistance level. One difficulty in any p.m.e. installation was to obtain proper fusing information in relation to the load to be carried.

Mr. G. H. Fowler asked whether there were any legal implication in the requirement of an indemnity if an earth-leakage circuit-breaker was used, as compared with the Board's neutral or the sheath of a metal-sheathed cable. Was it considered that the risk of a fatality was greater in the former case?

Mr. G. S. Buckingham said that the Midlands Board was impressed with the results of p.m.e. installations and was considering extending them in its own area. He thought that in spite of what Mr. Emerson and Mr. Robbins had said, the p.m.e. system—if it was sound—was 100 per cent safe. The broken neutral was the second line of defence and the danger was still quite small.

Insulation Strength

A NEW British Standard, B.S. 2918: 1957, has just been issued which describes test methods for determining the electric strength of solid insulating materials at power frequency for industrial purposes. The tests are intended to be used for investigational and design purposes and also as control and routine tests in specifications. The standard is based on a report received from the E.R.A.

Details of several test procedures are specified with due regard to the facts which determine their suitability. The appendices contain recommendations on the selection of test procedures, on the most suitable form of testing equipment and on matters which should be included in any description of an electric strength test. Copies of the standard may be obtained from the British Standards Institution, 2, Park Street, London, W.1, price 6s.

Iron and Steel Survey

THE 1957 edition of the "BISRA Survey" (British Iron and Steel Research Association) concentrates on news of research projects which have reached an interesting stage of development. The contents reflect the current interest in process control and automation, while the work of the Association's Development Section in assisting industry to adopt the results of research is especially featured.

Attention is drawn particularly to four technical articles on progress in forge mechanisation, showing the current approach of BISRA's Mechanical Working Division to the many problems in this field; the new system of translator control pioneered by the Plant Engineering Division; and a new system for the measurement of rolled rods, forgings, etc., at red-heat.

Electrifying the Railways

THE 1957-58 FARADAY LECTURE

THE first delivery of this year's Faraday Lecture was made on 26th November at Newcastle-upon-Tyne by Mr. G. H. Fletcher (General Electric Co.), who took as his subject the proposed electrification, during the next 15 years, of 1,210 miles of main-line and suburban railways in Great Britain, announced some time ago. The scheme also covers a change of the standard system from 1,500 V d.c. to 25 kV a.c. at 50 c/s.

In either case, the lecturer pointed out, d.c. traction motors were employed, but whereas British practice had hitherto been to convert a.c. to d.c. in substations adjacent to the railways, using only a moderate voltage for the overhead contact wires, the method now proposed was to carry out the conversion on the train itself, using a high voltage and a smaller contact wire.

Advantages over the 1,500 V system included a reduction in the number of wayside substations to one-sixth, their simplification through the absence of converting plant and, owing to the better load factor resulting from the larger area served by each, a lessening of plant capacity by one-third. The weight of copper overhead conductors would be 68 per cent less and of their steel supports 17 per cent less. Many of these substations could be placed near the grid, thus minimising the cost of feeder cables.

Adoption of 25 kV would, however, entail the use of larger insulators and greater clearances. To avoid constructional alterations under bridges and in tunnels near large cities, the voltage would be automatically reduced to 6,250 V by changing the tapping on the locomotive high-voltage transformer without varying the voltage applied to the driving motors or slowing down trains. In suburban and freight services, for which speeds were not very high, the motors would be axle-suspended, but for high-speed trains they would be mounted on the bogie frames, which were carried on springs, the drive being through a flexible coupling.

Many of the diesel locomotives to be built for shunting or running on lines with low traffic densities (to avoid capital expenditure on an overhead contact system) would be equipped with generators for transmitting power to the driving motors. These would differ little in regard to bogies and motors from electric locomotives, the chief alteration lying in the requisite substitution of interior apparatus. The power provided by a given size of diesel-electric locomotive (which carried its own power station) was much less than that available from an electric locomotive and first and maintenance costs were higher.

Train Heating

All trains would be electrically heated as soon as coaches could be equipped for the purpose; a twelve-coach express train under average and extreme winter conditions would require 120 to 240 kW. Automation, or an automatic series of operations that were independent of human control, had long been a feature of traction control as a means of producing a predetermined rate of acceleration up to a predetermined speed, safeguarding the motors against an interruption in supply current and warning the driver of excessive heating or other untoward happenings.

Large economies in coal consumption would certainly be made. Although on a test plant 8 to 9 per cent efficiencies have been obtained, this does not take into account wastage of coal during waiting periods, starting fires, running at uneconomical speeds and under other unfavourable conditions. The Ridley Report on National Policy for the Use of Fuel and Power Resources could not get any nearer an actual figure than to suggest that it lay within the range of 2 to 9 per cent and that no higher figures could be expected with any fuel.

The average efficiency for all power stations of the C.E.A. in 1956 was 25 per cent, based on kWh delivered to the grid at h.v. Including 26 per cent for losses in transmission, distribution and traction motors, an overall efficiency of about 19 per cent could be expected. With the larger and more efficient power stations now under construction in service, the power station efficiency will be increased from 25 to 31 per cent and the overall efficiency from 19 to about 24 per cent.

Fuel Economy

The estimated saving in coal would depend upon which figure between 2 and 9 per cent was taken for the overall steam engine efficiency for average service conditions, but taking a fairly optimistic figure, the saving in coal would be about 10 million tons per annum. This coal would be of the highest quality (suitable for export) compared with coal of the poorest quality used in power stations, equivalent to the amount saved by ten average-sized atomic power stations.

The greatest monetary savings would come from a reduction of about 50 per cent in running costs for wages, locomotive cleaning, boiler washing and maintenance of buildings and other items no longer needed. Owing to the greater availability of the electric locomotive (consequent upon its readiness for service at short notice), the total number could be reduced by about 30 per cent, while with the larger number of driving wheels and lessened wheel slip, double-heading would not so frequently be requisite and could be coped with by one driver.

Long-distance main-line electric trains were usually hauled by locomotives, while suburban trains were made up of multiple-unit motor coaches. This was because the amount of power a train could use depended upon the amount available and the proportion usable without slipping of the driving wheels. The gain in scheduled speed with electric motor coaches on a stopping service compared with steam locomotives was largely due to the higher acceleration possible by the use of the greatly increased number of driving wheels sharing the effort, which enabled the much higher power available from an external electricity supply to be utilised. Moreover, the energy taken in acceleration was proportional to the weight of the train.

An example of modern main-line electrification was afforded by the Manchester-Sheffield line over the Pennines, where the increased availability of the electric locomotive enabled it to cover in a 24-hour period a total mileage of 288 as against 100 for a steam locomotive, saving £170,000 a year for the service by the reduction in train crews by 315 men.

The stopping of trains at the right time (and only at the right time) involved two problems—one the control from the signal box by signals to the driver and the other

the methods adopted by the driver or independently of him in case of his default. The use of colour-light signals (operated by push-buttons from the box) in place of semaphore and of point operation by electricity or compressed air was to be greatly extended.

An extra safeguard would be provided in the automatic train control system, which indicated to the driver the position of a distant signal before the stop or home signal. Its essential feature was the alternation on the track of permanent magnets with electromagnets of opposite polarity energised from the signal box when the signal was at clear. A receiver magnet under the locomotive when passing over a permanent magnet tilted to open a contact which interrupted a circuit incorporating a delayed action device. When the receiver passed over the energised electromagnet, its magnet tilted the other way, re-energising the warning circuit before it had had time to initiate any action and indicating to the driver that the signal was at clear.

Two factors that permitted the mounting of a.c./d.c. rectifiers on locomotives were, first the development of germanium and silicon semiconductors, of small bulk and weight compared with the mercury-arc type and capable of dealing with very large currents, and secondly, the introduction of insulating materials for withstanding high temperatures.

Measuring Dynamic Characteristics

A DISCUSSION on the measurement of the dynamic characteristics of electrical machines was held at a joint meeting of the Measurement and Control and the Utilisation Sections of the Institution of Electrical Engineers on 19th November.

The subject was introduced by Messrs. J. M. Layton, V. N. Manohar and R. A. Stevens. Mr. Layton said that a difficulty found in evaluating parameters by frequency-response methods was the production of a generator of low-frequency inputs (0 to 25 c/s) with a current range varying from milliamperes to amperes. While electronic l.f. sources were adequate for fine-wire windings, the practical limit for paralleling output valves fell short of heavy current requirements. An electronic oscillator and amplifier feeding a single- or two-stage machine amplifier with a reasonable feed-back over the system provided one method, but it had drawbacks. The assumption that a rotary amplifier might be treated as a linear electrical circuit over-simplified the equivalent circuit of the machine and gave erroneous results in practice.

Transient characteristics of machines, due to system disturbances, were dealt with by Mr. Manohar, who reduced the factors to the accompanying changes in the electrical and mechanical quantities. The latter presented considerable difficulties because of lack of appropriate instruments. Relevant quantities fell into two classes; the first included speed, torque and load angle; the second comprised forces between conductors on end windings. Short-circuit torque could reach ten times full-load value.

A meter built at Imperial College had been used to measure the short-circuit torque produced in the shaft connecting a model synchronous machine (with reactances and time constants comparative with those of large machines) to its driving motors. One way of estimating the short-circuit forces on end windings was to take a high-speed ciné film of a replica of the end windings of a turbo-alternator under three-phase short-circuit conditions. The film had proved of great value in showing qualitatively and quantitatively the nature and magnitude of the forces.

Mr. Stevens referred to the impossibility of using power-frequency methods to measure the inductance of the windings; bridge methods and the three-voltmeter method had proved most unsatisfactory. The most suitable way seemed to be the direct evaluation of the fluxes, preferably by using search coils and a fluxmeter.

Wide discrepancies occurred between values of armature winding resistance obtained with the machine stationary and when running unexcited, the resistance in the latter case apparently increasing with the current. The discrepancies were caused by feedback owing to unbalanced air gaps and non-linearities in the iron of the flux paths. Another method was to load the machine and to calculate the resistance value from the fall in terminal voltage, but again the resistance apparently varied with the current. Armature inductance could be derived by putting a search coil on one of the two projections on each pole, thus measuring the flux per unit current set up by the armature winding.

Frequency-response and step-function-response tests compared well with graphs derived from measured values of resistance and inductance, but direct transformation from step function to frequency response gave very unsatisfactory results. The conclusion was that the dynamic characteristics of a machine could be determined fairly well from measurements of the resistances, inductances and voltage constants.

Transient or Dynamic?

Dr. W. G. Thompson (General Electric Co.) said that although the title of the discussion referred directly to dynamic characteristics, he noticed that the three speakers had referred to transient response. He did not know whether they meant exactly the same thing in both instances. Electrical engineers were apt at times to be a little conservative in their definitions and descriptions. He associated transient response with the response of the machine to a sudden disturbance which was very temporary, but he associated dynamic characteristics with a machine in rotating conditions where the responses were repeated. The key to the matter in problems of this nature was inertia in various forms.

Mr. Layton's explanation of the degrees of time constants with increasing frequencies probably explained the successful operation in many servo systems in practice. Many speed drives were checked at running speed and at inching or crawling speeds and it was frequently found that, provided the running speed was all right, little difficulty was experienced at crawling speeds.

Because of the variable nature of the quantities which had to be examined, in ordinary test conditions it was extremely difficult to avoid measuring some degree of dynamic characteristic, even when preparing to measure in steady state conditions. There was always something which changed or varied.

He agreed with Mr. Stevens that measuring remainder response on a practical test bed was a skilled art, especially when an enormous number of machines had to

be tested and a reasonably accurate answer given. It was possible to attack most of the problems by making an accurate survey of the steady state conditions, when dealing with machines with a steady torque curve, taking it up step by step and getting an accurate steady state plot and following that by a measure of the transient response and any response in opening or closing the circuit. The wider range of machines being introduced to industry, ranging from fractional h.p. to large turbo-alternators, called for methods appropriate to the circumstances of each case.

One frequently met difficulties through lack of manufacturing time when the production departments could not wait for tests to be made. Frequently, the first time the equipment came together was on the site. The essence of good design, notwithstanding information gained from theory and experiment, was to leave a sufficient margin in the design of the equipment so that it could be adjusted on site to give a proper response.

Mr. J. W. Parry (Nottingham University) said his department had found that the characteristics of the rotating amplifier did not agree with the theory given in the test books and that the common reasons given for the characteristics did not seem to be of major importance. He wondered whether it was reasonable to try to get the dynamic characteristics of a machine because when it was on site it was set up to give the required response by an adjustment of the brushes and the brush width.

Mr. B. Adkins (Imperial College) also queried the use of the word "dynamic," preferring "transient." The measurement of transient performance of machines became particularly difficult with very large machines such as large turbo-alternators used for supplying power systems. Model machines were very useful for that purpose. At Imperial College they called them "micro-machines" and they were used for studying various matters relating to torque and damping and stability. Their great merit was that many tests could be carried out to check theories. The Central Electricity Authority had from time to time carried out large-scale tests of full-size alternators and had obtained some very valuable results, but the scale of the organisation required and the efforts involved in carrying out the tests were very considerable in relation to the results obtained, and it was difficult to go into sufficient detail to get down to checking theory.

Mr. Morris (Imperial College) did not think it was good enough for designers to leave sufficient margin so that machines could be adjusted on site. What was wanted was a way of describing the performance of a machine to enable the manufacturer to communicate properly with the system engineer using the machine.

LETTERS TO THE EDITOR

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

Unshaded Street Lamps

I HAVE always wanted to put a question to public lighting engineers and your issue of 29th September brings me to the point.

Why, I would ask, cannot street lamps be fitted with shades in order to eliminate the glare and dazzle of lights in the distance? Admittedly there is a certain amount of cut-off by side screens in some designs, but as a rule on a long stretch of trunk road one can see every naked light for miles ahead, and if the road should dip a little the lights come directly on one's line of sight and are particularly trying to the eyes. Your photographs of New Oxford Street and also of a street in Indianopolis clearly show what I mean.

I should have thought that, with the modern high-level lighting, no more than three or four actual light sources need be visible to a pedestrian at any one time, and those well above the normal line of sight.

From your article it would seem to be a world-wide practice to set up rows of naked lights along the roads, but I would suggest that a new and bolder approach is required to endeavour to illuminate our roads by, as far as is possible, unseen sources of light.

Cheltenham. C. T. TRIGG.

Flat Rate for Electricity

I AM grateful to Mr. Schiller for his interest in my earlier letter, but I am afraid he has misunderstood me. The phrase "as if the undertaking were supplying him alone" refers to the standard m.d. tariffs, whereas Mr. Schiller's method surely comes within the ambit of the phrase "without being unduly hurt in the process." This latter phrase referred in general to such devices as a ceiling price or the availability of an alternative tariff.

With regard to the latter, having decided on what is considered an equitable tariff why should an alternative be offered when the "equitable" one proves to be on the "dear" side? If the lower-priced alternative is economic the original is not equitable. It is ridiculous that a given consumer can pay two (and sometimes three) different (average) prices per unit for identical operating conditions. This is exactly the same as my baker asking me do I want to pay price A or price B for my loaf!—"I cannot tell you the actual prices until you have bought a few loaves," he says, "and if you choose the wrong price at first that is just too bad, but you will know better for future purchases." Please let me stress the phrase "identical operating conditions." I am referring to a variation in average price resulting from a choice of tariff—not to the variation resulting from the effect of load factor, etc. I was perhaps cheating when I referred to system load factors of the order of 70 per cent, knowing this to be higher than the national average, but this figure does in fact obtain in the district where I am employed and I think the national figure must approach this in the not-too-distant future.

The reference to the electricity supply industry selling two products is, of course, the supply engineer's gospel which I also preach regularly. Very briefly and crudely the gospel behind my letter is this. Suppose I am in business selling electricity: I have a 100 kVA generator and, say, a dozen or so customers, each customer varying his demand throughout the day and none being regular for the whole 24 hours; but the demand on my generator is 100 kVA for 24 hours. I am just not interested in the

individual load factors of my customers; the load factor on my generator is 100 per cent, and I do not see why I should vary the price to the individual customer to match his load factor; all of which, of course, presupposes that the individual load factors are inherent (as maintained in my first letter) and are not to an appreciable extent influenced by the tariff.

Mr. Schiller's final remarks take us back to where I came in. Is it not unnecessarily complicating the issue to think in terms of varying lengths of distributor between services in relation to the domestic tariff? The rural cottage dweller does not these days have a different tariff from the occupier of an urban terrace house, and I think it is unnecessary to introduce the size of the house into the issue. There are more anomalies introduced by a tariff which charges according to the size of house than are avoided by it.

One other point is worth keeping in mind. A flat rate tariff (or more strictly a fixed block tariff with relatively large blocks) would create an enormous amount of goodwill. It becomes as near as possible to a pleasure to pay if one knows what one is paying for.

Liverpool. GEO. H. CURRIE.

Hirakud Hydro-Electric Scheme

IN a recent issue of the *Electrical Review* (4th October) there is an article on the Hirakud hydro-electric scheme in which it is stated (page 620):—

> "The original insulators on both the 132 kV and 66 kV lines were of toughened glass and were manufactured by Pilkington Brothers, Ltd. At a later stage, however, brown glazed porcelain insulators manufactured in Japan were substituted."

The inference, from the wording of this paragraph, is that the insulators we supplied had been taken down and replaced by Japanese porcelains, but as we had received no notification whatsoever that this was the case we took up the matter with British Insulated Callender's Cables, Ltd., to whom we supplied the insulators. They, in turn, wrote to the Indian *Journal of Power and River Valley Development* who say that the actual words used in their journal's special number on the Hirakud project were:—

> "The original supply of insulators for 132 kV and 66 kV lines were of the toughened glass type manufactured by Pilkington Bros., Ltd., England. Lately brown glazed porcelain insulators have been procured from Nippon Gaishi Kaisha, Ltd., Japan. It is claimed by the suppliers of glass insulators that whenever a disc becomes defective due to electrical, thermal or mechanical causes, the glass is completely shattered and this eliminates the need for any testing of the strings in service. If the glass is visibly intact the insulator must be electrically sound."

You will see from this, that the report in the *Electrical Review* has misrepresented the facts and, in the circumstances, we would be pleased if you would publish a suitable correction.

St. Helens. K. BOOTHROYD,
Pilkington Brothers, Ltd.

Ilgner Flywheel Equalising Sets

I FOUND the article by Messrs. Parkin and Pearson in the *Electrical Review* of 22nd November of absorbing interest. There are a few points, however, which would appear to require correction or clarification.

The statement that the Ilgner driving motor must be of the slipring induction type is not borne out in practice because for many years winding equipments in various parts of the world have been fed from Ward-Leonard Ilgner sets where the driving motor of the W.L.I. sets is a synchronous machine. It is also mentioned in the article that there is no control over the power factor. A leading power factor, however, can be obtained with consequent benefit to the system when the W.L.I. set is driven by a synchronous motor.

In such equipments the benefit of the flywheel stored energy and slip effect are brought about economically by having a hydraulic slip regulating coupling between the driving motor and the remainder of the set, whereby the synchronous motor rotates at constant speed. The tightness of the coupling depends upon the pressure of oil between the impeller and runner, and the pressure or filling is regulated by a torque motor which receives current from series transformers coupled to the leads feeding the stator of the synchronous motor.

There are imperfections with all known methods and much depends on the power supplies available, and it would be interesting to know whether the Ward-Leonard Ilgner sets incorporating hydraulic slip regulators and using synchronous driving motors are losing favour.

Could the authors give information as to the average life which can be expected from grid control mercury-arc rectifiers supplying large reversing mill motors on the usual three-shift working?

Sale, Manchester. GEO. BARNARD.

[We find in some quarters confusion between the straight Ilgner set and the Ward-Leonard Ilgner set, and a belief (wrongly) that the Ilgner set essentially incorporates W.L. control.—Editors, *Electrical Review*.]

Electricity Joint Consultation

Last Meeting of N.J.A.C. Under Present Organisation

AT the twenty-sixth meeting of the National Joint Advisory Council, the last to be held under the present organisation of the industry, Sir Henry Self, chairman of the newly constituted Electricity Council, said he would like to give a specific assurance that joint consultation would go on as it had done in the past. The N.J.A.C. would, in effect, continue in operation without a break. If, Sir Henry continued, there were to be any alterations in the machinery of joint consultation, they would be made by the contracting parties concerned. The staff who served the negotiating and consultative machinery would go to the Electricity Council, except for those who might be doing executive duties for the Generating Board.

Sir Henry said the industry would not split up, but would remain one family. As Lord Mills had stated, the industry was passing into a new era, and it would be the duty of the Electricity Council to solve the problems of the industry within the industry itself and to reconcile regional autonomy with national needs.

Members of the Council paid tribute to the services of Lord Citrine, who retires from the chairmanship of the Council. In his reply, Lord Citrine said that through joint consultation we were grappling with a basic problem, inherent in modern society. Millions of things were produced to-day by the masses by mass production and were sold in mass markets. He wanted to see that the people engaged in these processes had some voice in the conditions in which the processes were carried on. In his time there had been more strikes which were manifestations of some dissatisfaction than there had been strikes concerned with wages. Through joint consultation in industry we were trying to remove the real causes of such dissatisfaction. Lord Citrine concluded by saying that however regretful he was at relinquishing his position he had the comforting thought of what had been said by the members of the Council.

VIEWS on the NEWS

By REFLECTOR

NO matter where a power station is placed, there will be somebody who considers that it ruins the " amenities " of the area. One of the latest examples occurred recently in the *Manchester Guardian* when Mr. A. Craig Bell registered his dislike of the Ironbridge (Buildwas) power station. Other correspondents hastened to point out that the station is in an area which has been industrialised for the last hundred or two years. They agree in the opinion that " if Shropshire had to have a power station, no more fitting place for it could have been found." Incidentally, the original writer is corrected in two respects. One correspondent points out that the station belongs not to the " Western " Electricity Board but to the Midlands Board; actually, of course, it belongs to the Central Electricity Authority (Midlands Division). But he is right in saying that the station pre-dates nationalisation and was erected by the former West Midlands Joint Electricity Authority.

* * *

My attention has been called to a paragraph which appeared in the 8th July, 1864, issue of the *Building News* (now incorporated in the *Architect and Building News*). It ran as follows:—

> " DANGER IN THE ELECTRIC LIGHT !—It will scarcely be believed that Mr. W. de la Rue was obliged to insure Willis's Rooms for £20,000 before the electric light could be exhibited at his soiree, the office in which the premises were already insured having given the proprietors notice that the company would not hold themselves liable for any damage by fire while the electrical apparatus remained in the building. The ignorance which stimulated this proceeding on the part of the company is something so extraordinary, that, out of charity to other offices, the name should be published. We may mention here that some offices have recently refused to insure buildings in which an apparatus was used for naphthalising gas."

* * *

The Sunday Express has reported that:—

> " Lord Gretton himself did the electrical wiring for floodlighting during his daughter's coming-out dance at Stapleford Park, Melton Mowbray, last week-end. But at eight o'clock, before the guests arrived, the electric transformer blew up. And for most of the evening guests danced by candlelight."

I am reminded of Hilaire Belloc's " Lord Finchley," who, it will be remembered " tried to mend the electric light himself " with fatal results.

* * *

Although British house agents are never at a loss to find smooth phrases to describe the attractions of even the most unlikely properties, I have seldom seen the electrical installation listed among the " mod. cons." They might therefore study the campaign launched in the United States by an organisation known as " Living Better Electrically " which aims at ensuring that new houses are equipped with three major appliances, as well as a cooker, and have adequate power and lighting circuits. The *Electrical World* says that houses that conform to the prescribed standard will be awarded a bronze medallion. This will give prospective buyers a " recognised hallmark attesting to a new home's electrical livability " and it will be affixed outside the house " where it is visible but not conspicuous." All-electric houses will be awarded a gold medallion.

* * *

Back in May I mentioned the use in Baghdad of electric fans to provide draught for the charcoal fires on which *kebabs*, or *shashliks*, are cooked. Mr. F. E. M. Hardy writes from Iraq to report a further electrical development. He says:—

> "In at least one oil company residential area, whereas the traditional method is to put the charcoal in its tray and pour on an excess of kerosene (or insecticide) and light up, with the advance of electrical science, all this is changing. The fortunate possessor of an electric cooker now turns on one solid type boiling plate, and when it reaches a dull red heat, heaps the charcoal on it. When the charcoal has heated through, it is transferred to the tray, and cooking then proceeds in the traditional manner. Economic considerations limit the usefulness of this method, as outside oil company installations, electricity retails at a flat rate of around fourpence per unit, and so there are not very many cookers in use, and only an oil company can, or will, provide the necessarily heavy hot plate replacement maintenance, consequent upon this practice."

* * *

In view of next year's Universal and International Exhibition in Brussels, the following note from the *Electrical Review* of 25th November, 1887, is of interest. I should, perhaps, stress the point that this was seventy years ago, in case any contractor puts in for the job:—

> *" To Electrical Contractors.*—The Executive Committee of the Grand Competition of Sciences and Industry, Brussels Exhibition, 1888, invites the principal electricians of all countries to compete for the lighting of the buildings and grounds of the exhibition. The conditions of participation in the competition will be sent to the various firms, together with a form of application. The motive power is supplied gratuitously. A second invitation will be issued for the installation and working of electrical tramways. The project comprises traction by means of self-moving cars, and by means of locomotives constructed to draw two cars, each containing twelve persons. Applications must be forwarded to the manager of the section of lighting and electricity, 22, Rue de Palais, Bruxelles. This section is placed under the direction of Monsieur Mourlon, the well-known electrician, and Monsieur Bandsept as chief engineer."

PERSONAL AND SOCIAL

News of Men and Women of the Industry

Additional appointments are announced by the Central Electricity Generating Board.

Mr. W. Usher B.A., LL.B., has been appointed solicitor to the Board. He

Mr. W. Usher

Mr. J. M. Drummond

Mr. S. S. Scott

was appointed to his present position as deputy legal adviser to the Central Electricity Authority in February, 1948, and has had wide experience in local government administration, including electricity undertakings. He was admitted a solicitor in 1925, and for the following twelve years he held appointments as solicitor with various municipalities. He became deputy town clerk of Newcastle-upon-Tyne in 1937, and from 1940 until 1948 he was town clerk of Halifax.

Mr. J. M. Drummond, A.S.A.A., F.I.M.T.A., who is appointed the Board's chief financial officer, has been a deputy chief accountant of the Central Electricity Authority for the past six years, before which he was city treasurer of Sheffield. His former local government appointments included those of borough treasurer of Darlington and deputy city treasurer of Sheffield. He is an honoursman of the Society of Incorporated Accountants, and was a member of the Council of the Institute of Municipal Treasurers and Accountants before joining the electricity supply industry.

Mr. S. S. Scott, M.A.(Oxon), is appointed chief personnel officer of the Board. He is at present chief labour relations officer of the Central Electricity Authority, a post which he has held for the past seven years. He joined the Authority in November, 1947, as deputy director of establishments, and in April, 1949, he became deputy chief labour relations officer. Mr. Scott, who served with the King's Royal Rifle Corps during the 1914-18 war, became personal assistant to the general manager, Northmet Power Co., in 1921. Ten years later he was appointed staff officer of the company.

Mr. W. J. Rowland has been appointed deputy chief personnel officer. He has been the deputy director of establishments of the C.E.A. since 1950, having previously been secretary of Nos. 4 and 5 Sub-Areas of the Merseyside and North Wales Electricity Board. He first became associated with the electricity supply industry in 1929, when he was appointed personal assistant to the managing director of the British Power & Light Corporation, of which, as well as of its several subsidiary companies, he subsequently became assistant secretary.

Mr. E. J. Guinness, D.S.C., who becomes deputy secretary of the Board, was appointed an assistant secretary of the C.E.A. in March, 1948, and for the past six years has been the Authority's estates officer. From 1928 until nationalisation he was commercial manager of Electric Development & Securities Trust, Ltd., and of that company's various subsidiary electricity supply undertakings and was also a director of a number of them.

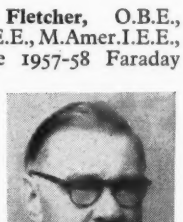
The Council of the Institution of Production Engineers has awarded the 1957 Schofield Travel Scholarship to **Mr. J. D. Parson,** Grad.I.Prod.E. Mr. Parson is senior methods production controller at Solartron Engineering, Ltd. He proposes to spend three months in the United States studying manufacturing techniques of small electro-mechanical mechanisms.

The annual ladies' night of the Birmingham Centre of the **Illuminating Engineering Society** was held on 7th November at the Botanical Gardens, Birmingham, Mr. G. E. Kemp, chairman of the Centre, who was accompanied by Mrs. Kemp, presiding over a gathering which included representatives of a number of local authorities. The guests of honour were Mr. E. B. Sawyer (president of the Society) and Mrs. Sawyer. A collection made during the evening on behalf of the E.I.B.A. realised £13 10s.

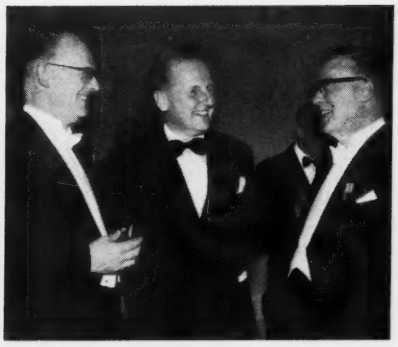
I.E.S. Birmingham Centre ladies' night. Left to right: Mr. G. E. Kemp (Centre chairman), Mrs. Kemp, Mrs. Sawyer, Mr. E. B. Sawyer (I.E.S. president), Mrs. B. Harcourt-Ellis and Mr. J. Beresford-Horniblow

Foxboro-Yoxall, Ltd., will shortly complete the move to its new factory at Redhill. The increased production capacity resulting from this move has called for an expansion and reorganisation of the staff and in this connection two further appointments are announced. **Mr. A. E. Parritt** has been appointed contracts engineering manager and **Mr. D. Phelps** becomes manager of the Application Engineering Department.

Mr. G. H. Fletcher, O.B.E., M.I.Mech.E., M.I.E.E., M.Amer.I.E.E., who delivered the 1957-58 Faraday Lecture on "The Electrification of the British Railways" at Newcastle-upon-Tyne on Tuesday (see page 969), received his technical education at the Harris Institute, Preston, and his practical training with Dick, Kerr & Co. (English Electric Co., Ltd.), being subsequently in charge of a.c. testing and experimental work at the company's Preston works. Between 1914 and 1954 he was with the Metropolitan-Vickers Electrical Co., Ltd., and its forerunner, the British Westinghouse Co., Ltd., during which time he held positions as chief engineer, Traction Motor Department; chief engineer and manager, Sheffield Works; general manager, Sheffield Works; director, M.V. Export Co.; and consultant. He



Mr. G. H. Fletcher



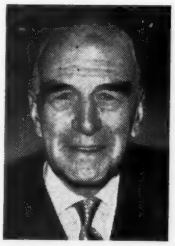
At the annual dinner of the Mersey & North Wales Centre of the I.E.E. held recently at Chester. Left to right: Dr. J. E. Taylor, Lt.-Gen. Sir Otway Herbert, Mr. T. Makin (chairman), Mr. T. E. Goldup (president, I.E.E.), Mr. S. Towill (Centre hon. secretary), Mr. F. Hart Davies and Mr. W. K. Brasher (I.E.E. secretary); Mr. J. Collins, Mr. J. E. Peters and Mr. A. J. Coveney. Below: Five past chairmen of the Centre. (Left to right) Messrs. E. L. Morland, P. C. Barnes, T. B. D. Terroni, E. W. Ashby and W. A. Hatch

is at present consulting engineer, Traction Department, General Electric Co., Ltd.

Mr. Fletcher has been chairman of the Traction Committee of the British Standards Institution, a member of the Faculty of Engineering of Sheffield University, and chairman of the Sheffield Sub-Centre of the Institution of Electrical Engineers.

The Minister of Power has appointed **Councillor A. W. Berry,** of Littleborough, Lancashire, to be deputy chairman of the North Western Electricity Consultative Council in succession to **Mr. C. Holden,** of Blackburn, who has retired on completion of his term of office. Mr. Holden is reappointed as a member of the Council.

Mr. B. W. A. Dickson has been appointed chairman of Oliver Pell Control, Ltd., in succession to the late Mr. R. Sefton - Turner. Mr. Dickson, after many years with the Vickers group of companies as director and general manager of the aircraft division, is now a director of Alltools, Ltd., Flight Refuelling, Ltd., Flight Refuelling (Holdings), Ltd., and Prodorite, Ltd., in addition to his new appointment as chairman of Oliver Pell Control.



Mr. B. W. A. Dickson

Mr. W. Thurner, technical director of Falk, Stadelmann & Co., Ltd., is at present visiting South Africa, Rhodesia and East Africa, and **Mr. H. G. Allen,** director, has just returned from an extended tour of the United States.

In his review of the past financial year (reported in the Financial Section of this issue), Mr. Albert Parkinson, chairman of Crompton Parkinson, Ltd., mentions that **Mr. J. Harwood Fryer,** A.C.A., is retiring on 31st December next from his executive duties as managing director. Mr. Fryer has been with the group for thirty-one years, and has been a managing director of the company for the past eleven years. Mr. Parkinson also announces that **Mr. M. H. L. Lewis** and **Mr. Michael Parkinson** have been appointed managing directors of the company and will share with **Mr. J. V. Daniel,** who was appointed a joint managing director in 1953, the responsibility for the management of the affairs of the group.

Mr. J. M. Hallett, manager of the Publicity Department of Ferranti, Ltd., has been elected a member of the B.E.A.M.A. Publicity Committee.

At the annual meeting of the Electrical Trades' Commercial Travellers' Association held on 15th November in London, **Mr. W. S. Lewis,** C.B.E., J.P., Companion I.E.E., A.C.T. (Birmingham), was elected president of the Association for the ensuing year, and **Mr. F. A. Bartlam** was elected chairman. Other elections were:—Vice-chairman, Mr. S. Barker; hon. secretary, Mr. J. H. Bowen; hon. treasurer, Mr. R. T. Yates; hon. subscription secretary, Mr. C. K. Heffernan; charity steward, Mr. S. Johnson; hon. employment secretary, Mr. C. F. Saunders; and hon. Press steward, Mr. E. R. Stickley.

Mr. Lewis, the new president, is well known as chairman of the Midlands Electricity Board and for his activities in connection with Birmingham municipal affairs. He is an alderman of the City of Birmingham, a magistrate of the city, and was Lord Mayor for 1942-43. He served as a member of the West Midlands Joint Electricity Authority for eighteen years, and at the time of nationalisation was vice-chairman of the Authority. He is a member of the Central Electricity Authority.

Mr. Bartlam, the Association's new chairman, joined the Electrical Trades Supply, Ltd., Birmingham, in 1946, after service in the R.A.F., and he was appointed director and secretary of the company in 1951. He has been a member of the Birmingham Branch of the E.T.C.T.A. since its inception and was branch chairman in 1954. He has been hon. secretary of the Midlands Branch of the Electrical Wholesalers' Federation since 1950 and chairman of the E.I.B.A. Birmingham District since 1955.

At the Association's annual meeting it was decided to donate the sum of £500 to the E.I.B.A. In addition, Mr. D. G. E. Barrie (vice-president) decided, through the Association, to give £500 to the E.I.B.A. to mark his fifty years in the electrical industry, and also a further £500 from his company, Metway Electrical Industries,

Mr. W. S. Lewis

Mr. F. A. Bartlam

Mr. L. C. Penwill (director, Electrical Contractors' Association) being received by Mr. H. Vernon (chairman, Association of Electrical Machinery Trades) at the recent annual dinner-dance of the A.E.M.T. reported in our last issue

Ltd., to mark its 21st birthday. Mr. E. G. Jones, a member, also gave £21 (through the Association) to the E.I.B.A. A sum of 100 guineas was voted to the Royal Commercial Travellers' School, Hatch End, Mr. D. G. E. Barrie supplementing this with a further 25 guineas.

Members of the Association are reminded that the annual "stag party" will be held on 13th December at the "Windsor Castle," Victoria, S.W. Tickets (18s each) can be obtained from Mr. F. J. Simons, 42, Lower Barn Road, Purley, Surrey.

The Minister of Labour and National Service has appointed **Mr. T. W. McCullough,** O.B.E., to be H.M. Chief Inspector of Factories in succession to **Sir George Barnett,** who is to retire on 31st December next. Mr. McCullough has been a Deputy Chief Inspector since December, 1953.

Mr. P. S. Watson, M.I.E.E., A.M.I.I.A., has been appointed Brighton and Hove district manager of the South Eastern Electricity Board, in succession to **Mr. A. M. Harker,** who is now Mid-Sussex area manager. Mr. Watson has been manager of Seeboard's West Kent District since 1948.

Mr. P. S. Watson

After general education at Tynemouth High School Mr. Watson continued his studies at Sunderland Technical College and London Polytechnic while receiving practical training with A. Reyrolle & Co., Ltd. He was with the Northmet Power Co. at Stevenage as assistant district engineer from 1930 to 1941 and afterwards became district engineer to the Grampian Co., Ltd. In 1942 he joined the Air Ministry and served as mechanical and electrical engineer until 1945 when he joined the Beds., Cambs. & Hunts. Electricity Co. as principal assistant.

The board of the Brush Group, Ltd., announces the following appointments:—**Mr. J. Calderwood,** M.Sc. (Marine Eng.), at present technical director of Associated British Oil Engines, Ltd., has been appointed an executive director of the board of the Brush Group; **Mr. Maurice Tattersfield,** A.C.A., F.C.C.S., hitherto managing director of the Brush Electrical Engineering Co., Ltd., Loughborough, is relinquishing these responsibilities and has been appointed an executive director of the board of the Brush Group. He remains a non-executive director of the Brush Electrical Engineering Co.; **Mr. B. L. Goodlet,** O.B.E., M.A., M.I.C.E., M.I.Mech.E., M.I.E.E., hitherto director and chief engineer of the Brush Electrical Engineering Co., Loughborough, has been appointed managing director of that company; and **Mr. R. G. Hooker,** director and general works manager, Brush Electrical Engineering Co., has been appointed director and general manager of that company.

Mr. W. P. Mansfield, A.K.C., Ph.D., B.Sc.(Hons.), has been appointed director of research of the British Internal Combustion Engine Research Association with effect from 1st March next. He is to succeed the first director of the Research Association, **Engineer Rear-Admiral D. J. Hoare,** C.B., M.I.Mech.E., who is retiring. Dr. Mansfield is at present chief research engineer of the Association.

Mr. R. F. Hanks, M.I.Mech.E., has joined the board of Parkinson & Cowan, Ltd. He is a director of the British Motor Corporation and of the Nuffield Organisation, and is also part-time member and the chairman of the Western Area Board of the British Transport Commission.

Mr. A. P. Besson has left the board of directors of Besson & Robinson, Ltd., and has formed a new company, A. P. Besson & Partner, Ltd., which will specialise in the design and manufacture of miniature electro-mechanical components. A factory is being erected at Hove which is expected to be in operation by February next.

Mr. B. R. Beebee has been appointed manager of the London office of Henry Meadows, Ltd., at 37-41, Bedford Row, W.C.1.

Mr. J. W. Plowman (Dewrance & Co., Ltd.) has been elected chairman of the British Valve Manufacturers' Association for the year 1957-58. The retiring chairman, **Mr. N. P. Newman** (Newman, Hender & Co., Ltd.), has been elected vice-chairman.

Mr. H. P. Potts, M.I.Mech.E., has joined the board of directors of the Colchester Machinery Corporation, Ltd., of Toronto, Montreal and Vancouver, which is associated with the Colchester Lathe Co., Ltd., of Colchester, Essex. Both are members of the George Cohen 600 Group of companies.

The annual dinner and dance of the Southern Centre of the **Institution of Electrical Engineers** will be held on 12th December at the Polygon Hotel, Southampton. Applications for tickets (30s each for members and 15s each for graduates and students) should be made by 6th December to Mr. C. G. Bramner, Southern Electricity Board, Magdalen Road, North End, Portsmouth.

Mr. H. Liley has been appointed secretary of Fonadek (Branson), Ltd. In addition to his secretarial work his duties will include general administration at the head offices and branches.

On 22nd November at the Borough Hall, Stafford, presentations of awards were made to apprentices of the **English Electric Co., Ltd.,** by Lt.-Col. H. Llewellyn. The Stafford Shield,

Lt.-Col. H. Llewellyn presenting the Stafford Shield to the joint holders, Patrick J. Wilson and John C. Ray

awarded annually to the craft or technical apprentice who, in the opinion of his fellow trainees, shows outstanding personal qualities, was this year awarded jointly to Patrick J. Wilson and John C. Ray. Edward J. Varley won the foremen's shield.

Mr. J. W. G. Bird, O.B.E., D.L., A.M.I.E.E., chief engineer of the South Wales Electricity Board since April, 1948, is retiring on 31st December next after more than forty-six years' service in the electricity supply industry. Before 1948 Mr. Bird was distribution engineer between 1934 and 1937 and assistant general manager between 1937 and 1948 of the South Wales Power Co., and before joining that company he was engaged in various engineering capacities with the Shropshire, Worcestershire & Staffordshire Power Co., in whose service he commenced his career in 1911.

Mr. Bird was appointed as a Deputy Lieutenant for Monmouthshire in

Mr. J. W. G. Bird

Mr. J. S. Lombard

1945. He served in the 1914-18 war with the Royal Warwickshire Regiment and the Motor Machine Gun Service. During the last war he was Second-in-Command of the 4th Battalion of the Glamorgan and Monmouthshire Home Guard. He was a member of the British electricity supply delegation which visited Russia in April and May, 1956.

Mr. J. S. Lombard, B.Sc.(Eng.), A.M.I.E.E., has been appointed to succeed Mr. Bird as chief engineer of the Board. He will take up his new duties on 1st January. Mr. Lombard has been deputy to the chief engineer since vesting date. He is a native of Cardiff and has served in the electricity supply industry in South Wales for twenty-six years, having joined the staff of the South Wales Electric Power Co. in September, 1931. He was educated at St. Illtyd's College, Cardiff, and at the University College of South Wales and Monmouthshire and the Technical College, Cardiff.

The Scottish industry was congratulated on its organisation of the Scottish Electrical Training Scheme by Mr. W. K. Brasher, secretary of the **Institution of Electrical Engineers,** speaking at the Scottish Centre dinner in Glasgow on 19th November. He said the scheme was a wonderful model which England was seeking to develop. It was more important in view of the Russian developments and the need for maximum expansion of educational work in Great Britain.

The guests, numbering some 300, were welcomed by the President, Mr. T. E. Goldup, and the Scottish chairman, Mr. E. O. Taylor, and their ladies. Mr. Taylor referred to the fifty years of active life of the Scottish Centre and the contribution of notable Scots to electrical science and technology. The principal guest, Mr. A. Stewart, Controller for Scotland of the B.B.C., referred to the close bonds between the personnel of the B.B.C. and the I.E.E., and Mr. Goldup spoke of the contribution made by Scottish members to the Institution's life and activities and expressed anxiety at the falling number of student members.

The toast to the guests and kindred institutions was proposed by Dr. A. J. Small (chairman, South West Scotland Sub-Centre), and replied to by Professor J. Small (president, the Institution of Engineers and Shipbuilders in Scotland). The toast to the chairman was proposed by Mr. R. J. Rennie (senior vice-chairman, Scottish Centre) and the reply was given by Mr. Taylor.

The Eastern Electricity Board has appointed **Mr. R. J. Honniball,** manager of the Chelmsford District, to be assistant chief commercial officer in charge of policy, planning and development. Mr. Honniball, who is designated deputy chief commercial officer, succeeds **Mr. E. Bates,** who was recently appointed chief commercial officer of the North Eastern Electricity Board.

Mr. R. J. Honniball

Mr. Honniball was educated at Dartford Grammar School and Erith Technical College. He served his apprenticeship with Callender's Cable Construction Co., Ltd., at Erith and in 1925 was appointed a contracts engineer with the company engaged on electrification schemes in London, Birmingham and on the South Coast. He joined the Weald Electric Supply Co., Ltd., in 1929 as mains engineer and deputy manager of the company. In 1934 he was appointed manager and engineer to the South East Kent Electric Power Co., Ltd., and from 1945 until vesting day he was the Mid and North Essex regional manager of the County of London Electric Supply Co., Ltd.

During the war Mr. Honniball, while carrying on his ordinary duties, was also appointed to co-operate with the Ministry of Fuel and Power, Petroleum Warfare Department, in the development of "Pluto," and in this capacity he designed and installed certain electrical equipment on the south coast. He is a vice-president of the Chelmsford Engineering Society and a member of the Engineering Advisory Committee of the Mid-Essex Technical College.

At the I.E.E. Scottish Centre dinner-dance. Left to right (seated): Mrs. de Villiers, Mrs. Mendelson, Mrs. Goldup, Mr. T. E. Goldup (President, I.E.E.), Mrs. Taylor and Mrs. Small. (Standing): Mr. J. H. P. de Villiers (Scottish hon. secretary), Dr. A. J. Small (chairman, South-West Scotland Sub-Centre), Mr. E. O. Taylor (Centre chairman), Mr. W. K. Brasher (secretary, I.E.E.), and Mr. J. Mendelson (chairman, South-East Scotland Sub-Centre)

Mr. Leslie Gamage has been appointed chairman of Pirelli-General Cable Works, Ltd., in succession to **Sir Harry Railing** who has resigned from the board. **Mr. T. W. Heather** has been elected a director.

The Minister of Power has reappointed the following chairmen and deputy chairmen of Area Electricity Boards:—South Eastern: chairman, **Mr. N. Elliott,** C.B.E., J.P., M.A., M.I.C.E., M.I.E.E.; deputy chairman, **Mr. W. R. T. Skinner,** B.Sc., A.K.C., M.I.Mech.E., M.I.E.E. Midlands: chairman, **Mr. W. S. Lewis,** C.B.E., J.P., Companion I.E.E., A.C.T.(Birm.). Merseyside and North Wales: deputy chairman, **Mr. J. Rankin,** O.B.E., F.C.I.S., Companion I.E.E.

OBITUARY

Mr. Reginald Weaving, M.I.E.E., formerly a director of the British Electric Transformer Co., Ltd. (one of the Crompton Parkinson group of companies), and former general manager, died on 21st November at the age of seventy-five.

Mr. Weaving joined Crompton Parkinson, Ltd., at Chelmsford in 1927 as transformer engineer, and went to the British Electric Transformer Co. as chief engineer in 1933, later being appointed general manager; he became a director in 1939. Mr. Weaving retired from the position of general manager at the beginning of 1947, and resigned from the board earlier this year.

Mr. Frank S. Allen, M.I.Prod.E., works director of E. K. Cole, Ltd., and a director of Ediswan-Ekco (Aust.) Pty., Ltd., Egen Electric, Ltd., Ekco Electronics, Ltd., and the National Ekco Radio & Engineering Co., Ltd. (India), died on 20th November at the age of fifty-six. Mr. Allen commenced his career in the motor industry as an Austin apprentice, and subsequently held executive and

managerial positions with the Austin Motor Co., Ltd., Citroen Cars, Ltd., etc., with whom he gained a wide experience of works and production problems. He joined E. K. Cole, Ltd., in 1941 as assistant works manager and four years later was appointed general works manager, radio division. He was largely responsible for the change-over from war to peace production of the Ekco factories. Mr. Allen was elected to the board of E. K. Cole, Ltd., in 1951. He was vice-president and an executive committee member of the Engineering and Allied Employers' London District Association, and chairman of the Southend and District Local Employment Committee.

Mr. George Frederick Tew, head of the firm of W. H. Tew & Co., electrical contractors, of Nottingham, died on 20th November at the age of fifty-two. Mr. Tew and his brother, Mr. Harold Tew, became partners in the business in 1949 when their father died. When his brother died in 1955, Mr. G. F. Tew became the sole proprietor. He was for many years chairman of the local branch of the Electrical Contractors' Association.

Mr. William Jones, of W. Jones & Co., electrical contractors, of Rhyl, died suddenly at his home on 19th November.

Mr. R. J. Hetherington, works accountant of the Micanite & Insulators Co., Ltd., died on 19th November at the age of sixty-one. He had been with the company for thirty years.

Mr. G. Swope.—The death occurred in New York on 20th November of Mr. Gerard Swope, former president of the American General Electric Co. and the International General Electric Co. He was eighty-four.

L.E.B. Scrap Disposal

In a letter to *The Times*, Mr. H. J. Randall, who was chairman of the London Electricity Board from its inception until last year, refers to the recent report of the Committee of Privileges on matters arising between Mr. G. R. Strauss, M.P., and the L.E.B. (see *Electrical Review*, 22nd November, page 935).

Mr. Randall says that he accepts full responsibility for the system adopted by the Board for the disposal of scrap metal, which is particularly heavy in the London area. If it had been decided to store the scrap locally until large quantities were available and then invite tenders it would have needed more transport, a larger staff, and more storage space than the Board had available; and it "would have increased the temptation which valuable metal appears to create for the impecunious." He is convinced that the Board was right in adopting the alternative method, asking firms to quote in advance for scrap arising each year.

Patents and Registered Designs

IN the House of Lords last week the Lord Chancellor, Lord Kilmuir, when moving the continuance of certain wartime emergency powers, said they included provisions relating to patents and registered designs. There had been much discussion with industry about these regulations and he hoped that it would not be long before the Government's Bill dealing with the subject came before Parliament.

This subject is also being raised in the Commons. Mr. Alan Green has introduced the Registered Designs Act, 1949 (Amendment) Bill, to give greater protection to the proprietors of designs. Under the present system it takes two to six months from the date of application for a design to be registered. In this period the owner of the design has no protection. What Mr. Green proposes in his Bill is that the registration of the design should be back-dated to the date of application, the owner of the design indicating whenever it is possible, on the fabric or metal, that registration has been applied for.

The use by the Government of the "know-how" related to patented inventions and registered designs will be more narrowly confined by the Defence Contracts Bill which was presented for first reading in the House of Commons this week. It makes clear that although the Patent Act and Registered Designs Act enable "know-how" to be used in the services of the Crown, the Government must not reduce the value of the information by requiring its disclosure, and that the owner of the invention or design has a right to compensation.

Perhaps the most important Clause is that which revokes the emergency powers operated under these two Acts which enabled the Government to treat a large number of uses as services of the Crown. These emergency regulations were disliked by inventors and industrialists alike because they permitted the Government to use "know-how" not merely for defence contracts but for all Government contracts, yet they contained no specific provision for compensation. Neither was there any appeal to the Court about compensation.

Power Station Cooling System

THE Central Electricity Authority announces that it is investigating a cooling system for power stations using cooling towers that are not dependent on large volumes of make-up water. The Authority considers that the potentialities of the new system should be thoroughly explored as part of the continuing search for new and improved techniques of power generation, and negotiations are at present in hand for the design and construction of a commercial scale installation.

The system employs jet condensers instead of surface condensers within the power station. The warm water that has to be cooled will be pumped in a closed circuit through large heat exchangers (or radiators) fitted around the base of the dry cooling tower. These must transfer the whole of the waste heat direct to the air passing up the towers, whereas in ordinary water cooling towers most of the heat is lost by evaporation of water. For this reason dry towers must circulate more than three times as much air as ordinary towers of equal cooling capacity, and they will be larger structures occupying more ground space.

The dry cooling system seems likely to be much more costly than existing water cooling systems, but if it proves successful in operation the extra cost might in some circumstances be partly offset by economies in other directions, the most significant being the saving in fuel transport costs that would accrue if coal-fired stations could be sited closer to collieries in water-scarce areas.

R.I.C. Annual Dinner

Mr. G. Darnley-Smith, chairman of the Radio Industry Council, presided at the Council's annual dinner on 20th November at the Dorchester, London, W.1. The principal guest was Lord Mancroft, Minister without Portfolio, who proposed the toast "The Radio Industry." Lord Mancroft, referring to recent Russian achievements in production engineering and automatic control, warned his audience that Russia might be more formidable as a competitor in the economic sphere than as a possible military enemy. Although the Government was spending more on electronic development the work was more concentrated. This might be prejudicial to some of the smaller firms, some of whom might find it desirable to amalgamate with others, while some acted as specialist sub-contractors.

Mr. Darnley-Smith responded to the toast and the health of the guests was proposed by Mr. T. E. Goldup (President, I.E.E.), the reply being made by Mr. Charles Orr-Ewing, Parliamentary Under-Secretary of State and vice-president of the Air Council.

Electrical Power Engineers

THE thirtieth annual dinner of the Electrical Power Engineers Association was held on 22nd November under the chairmanship of its president, Mr. L. Benallick. The toast of "The Association," as the only trade union representing the technical staff engaged in all aspects of electricity supply from generation to distribution, was proposed by Sir Henry Self (chairman, Electricity Council). It was a critical need, he said, that the Association should preserve its unity and the great traditions that had inspired its members since its foundation in 1919. These were based on principles of strong loyalty to the industry that formed their background and on keen service to the public. In this the Association owed much to the wise guidance of its three successive general secretaries —Messrs. E. A. Jones (who was present on this occasion), the late Jim Wallace (of whose sterling qualities he could speak from intimate knowledge), and H. Norton. Sir Henry also expressed appreciation of the effective part played by Messrs. A. E. Hawkins and L. Benallick in negotiations on the National Joint Board and by Mr. A. M. F. Palmer in Parliamentary and other fields. The salaries structure was now, he believed, comparable with that in other industries.

Responding, the president, after referring to Sir Henry's distinguished career in Government service, admitted having once feared that nationalisation would impose on the industry the dead hand of bureaucracy. This fear had proved groundless and it was to Sir Henry (as gamekeeper turned poacher) that the Association looked to secure the large sums of money needed to maintain the efficiency and productivity of the electricity supply industry. The E.P.E.A. welcomed his support of the principle that technical men should occupy the highest managerial positions. There was a feeling that joint consultation with the technical staffs too often took place after an event rather than before. The Association was registered as a trade union because it held that collective bargaining was as sound for technical as for manual workers. The power this gave the Association had been used responsibly for nearly 40 years and would continue to be so used. After welcoming a number of distinguished guests present, the president concluded by thanking Mr. F. H. Smethurst for once again organising the function, which in accordance with the now established custom, ended with a dance.

1. Mr. A. M. F. Palmer, Mr. L. Benallick (President), Lady Geddes, Sir Vincent Tewson. 2. Mr. and Mrs. C. Donnellan and Mrs. H. O. Mayfield. 3. Mr. and Mrs. H. Norton, Sir Henry and Lady Self. 4. Mr. and Mrs. D. B. Irving, Mr. and Mrs. E. J. Turner. 5. Sir Charles Geddes, Mrs. A. M. F. Palmer, Lady Tewson and Mr. H. Norton. 6. Mr. and Mrs. W. A. Gallon, Mr. L. Benallick and Mr. J. E. Stanton

Mrs. H. Norton, Mr. H. E. Bolton, Mr. G. Dutton, Mrs. Mayfield, Mrs. Dutton and Mrs. Bolton

Nuclear Propulsion of Ships

Technical and Economic Investigations

IN a paper on "The Nuclear Propulsion of Ships" which they presented to the Joint Nuclear Marine Propulsion Panel yesterday (Thursday) Sir Christopher Hinton and Mr. R. V. Moore said that the possibility of using reactors of the graphite-moderated gas-cooled type for propelling supertankers had recently been investigated. One scheme aimed at the development of a 50,000 s.h.p. unit driving a twin-screw 100,000 ton deadweight ship. This comprised a reactor and two heat exchangers, each with its steam turbine driven axial flow compressor to circulate the carbon dioxide for raising the steam for the main turbines. The vertical reactor pressure vessel in which the carbon dioxide flowed downwards was supported directly from the tank bottom of the ship within a biological shield. This shield was lined internally with a mild steel plate in which 80 or 90 per cent of the radiation from the reactor was attenuated. The centre of mass of the graphite moderator was situated some 8ft below the centre of roll of the ship. There were two parallel cooling circuits, each with its own heat exchanger and gas circulator. These were connected to each other and to the pressure vessel by two 2ft 6in diameter ducts with creased bends.

Arrangement of Equipment

The heat exchangers were supported with their axes horizontal to the side and forward of the reactor at tank top level. The two circulators lay between the inner longitudinal bulkheads in a separate flat some 15ft above tank top level. The reactor was loaded and unloaded with uranium from the top. The deck for this operation was 20ft below upper deck level, the intervening space being used for housing the necessary machinery. The control rods were mounted on either side of the reactor in compartments shielded from the gas ducts. The gas activity levels in the circulator and heat exchangers necessitated their being lightly shielded, but the turbo-circulators and their condensers, the steam drums of the heat exchangers and their associated equipment were outside the shielded area.

The weight of the reactor and machinery was about 500 lb/s.h.p., nearly half of which was due to the radiation shielding round the reactor itself. This was much less than that of the Calder Hall plant, but was about three times as heavy as a conventional marine installation with a turbo-electric drive. Conventional plant, however, required 5,000 or 6,000 tons of bunker fuel oil at the outset of a voyage, whereas the nuclear plant needed only 15 tons of uranium and this was sufficient to fuel the ship for about a year. Taking this into account the weights of the nuclear and conventional plants were roughly equivalent. This rough weight equivalence was also repeated on a volume basis, the length of machinery space to accommodate the reactor unit and main machinery being about 24 per cent of the length of the ship compared with 17 to 18 per cent for a conventional tanker. As the rating increased, however, the core size for a given output from a reactor of this type diminished and neutron leakage became prominent. Neutron economy was also reduced by the surface-to-fuel ratio of the fuel which had to be increased to achieve high rating. These effects would require the use of small quantities of enriched fuel which would have to be manufactured in a diffusion plant on land at a high capital and running cost. The potential advantage of a reactor which could operate on a plutonium equilibrium cycle with a natural uranium feed was that the amount of natural uranium would be small.

The economic advantage of using a highly rated graphite-moderated gas-cooled reactor to drive ships of the supertanker class was that though the capital cost was at present about 50 per cent more than that of a conventional plant the running costs were less for a 50,000 s.h.p. unit, but tended to rise steeply below about 25,000 s.h.p. In fact operating costs fell more steeply with increasing deadweight for the nuclear than for the conventional ship and the same would be true if the service speed were increased.

Manœuvrability Problem

Among the problems that had to be considered in connection with the marine application of nuclear power was the effect of the xenon, which was produced when the uranium nucleus was fissioned, on the manœuvrability of the ship. The production of this isotope caused neutron loss which must be compensated for by enrichment of the fuel to maintain the chain reaction. When the nuclear power was reduced this effect became accentuated as the rating of the fuel was increased. This was serious since marine reactors would tend to be highly rated in order to reduce their weight per horse power. It could, however, be overcome by enrichment of the fuel. If this were not done up to 24 hours would have to elapse before the reactor could be re-started after a shutdown and the rate at which reactor power might be reduced was severely limited. In order to be able to manœuvre the ship at all times some additional conventional plant could be provided or the reactor could be allowed to work at constant power continuously, the surplus steam being rejected to the main condensers or to an atmospheric dump condenser. The cost of this would have little effect on the operating cost of the ship.

In concluding their paper the authors dealt with the safety of reactors on board ship and said that given proper design there should be no risk from radiation after foundering or collision. Careful consideration would, however, have to be given to the problems involved where ships entered ports in built-up areas or the territorial waters of a foreign power.

Combustion Engineering Conference

THE purpose of a conference held by the Combustion Engineering Association at Harrogate on 5th and 6th November was to examine the information presented in the N.I.F.E.S. Third Progress Survey. Proceedings were opened by Sir Leslie Hollinghurst (chairman of N.I.F.E.S.), who was introduced by the president of the Council, Mr. H. C. Hawkins. The chair at the sessions was taken by Mr. S. P. Chambers (a deputy chairman of Imperial Chemical Industries, Ltd., and a part-time member of the National Coal Board). Dr. W. A. Macfarlane, chief executive of N.I.F.E.S., outlined the progress made by N.I.F.E.S. and the hoped for achievements in the near future. The chief engineer, Mr. L. Clegg, delivered a paper on the efficiency of operation of shell boilers. A full report of the conference will shortly be available on request to the Association at 6, Duke Street, St. James's, S.W.1.

INDUSTRIAL NEWS

British Nuclear Power Station for Italy

The Nuclear Power Plant Co., Ltd., has received from Ing. Mattei, president of Ente Nazionale Idrocarburi, Rome, a letter of intent to negotiate the construction of nuclear power stations in Italy, and also to conclude a long-term agreement for mutual co-operation on the design and development of power reactors. The agreement will be made between the N.P.P.C. and AGIP Nucleare, a subsidiary of E.N.I., and will refer to reactors of the gas-cooled type. Throughout the negotiations, both parties have had the co-operation of the United Kingdom Atomic Energy Authority and their staff.

The first station to be constructed under this arrangement will have an output of 200 MW and will involve the manufacture in the United Kingdom of considerable quantities of plant. The Nuclear Power Plant Co. will be responsible for the overall design and commissioning of the station, while AGIP Nucleare will place all local contracts and will carry out the site erection. As Italian knowledge of the special plant grows so will the country's participation in manufacture increase. The technical agreement involves the exchange of information which during the first few years will be largely from the United Kingdom to Italy, but it is hoped that later the Italians will contribute their full share.

The single 200 MW reactor for the Italian station will be of the same overall dimensions as the 150 MW reactors at the power station being constructed by the Nuclear Power Plant Co. at Bradwell-on-Sea, the increase in output reflecting the research and development that has taken place since the Bradwell design was accepted a year ago.

Generating Plant for Nuclear Submarine

W. H. Allen, Sons & Co., Ltd., have received a contract for the construction of steam turbine-driven generating sets in connection with the nuclear submarine, H.M.S. *Dreadnought*, to be built by Vickers-Armstrongs, Ltd. Units will be installed at Dounreay for shore tests and others in the ship. The turbo-generators incorporate electrical equipment supplied by the British Thomson-Houston Co., Ltd. The condensers, which are separate from the turbo-generators, will also be supplied by W. H. Allen, Sons & Co.

Other contracts recently received by the company include an epicyclic gear to be incorporated in a tower-mounted friction hoist at the Monktonhall Colliery of the Scottish Division of the National Coal Board. The gear will be suitable for transmitting the peak torque which is equivalent to 3,200 h.p. from the English Electric motor running at 475 r.p.m. to the winder drum. The company is also supplying an epicyclic gear designed to transmit 13,000 h.p., ordered by Richardsons Westgarth (Hartlepool), Ltd. This gear is for an extra high-pressure steam turbine of advanced design driving a 9,500 kW alternator, for the Steel Company of Wales. The gear will reduce the turbine speed of 9,500 r.p.m. to the alternator speed of 3,000 r.p.m. The gears for these contracts will be constructed at the company's new gearing factory, Atlas Works, Pershore, Worcestershire.

Forty-Hour Week Claim Rejected

At a meeting of representatives of the Engineering and Allied Employers' National Federation and the Confederation of Shipbuilding and Engineering Unions last week it was announced that the employers were unable to accept the demand for a 40-hour week in the engineering industry. They also rejected claims for a holiday pay rate of £2 a day and a provision to compel workers to take their full 16 days' holiday a year.

Mr. B. Macarty, director of the Federation, said that the employers could not agree that a 40-hour week without loss of pay would not necessarily mean an increase in costs. It could be assumed that it would add at least 10 per cent to the wages bill. He said that some of our principal competitors in Europe were still working a basic week in excess of 44 hours and our competitive position would be more seriously tested when the Free Trade Area became a reality.

Mr. W. J. Carron, chairman of the Engineering Committee of the Confederation, said that the unions were very disappointed at the categorial rejection of their claim for a shorter week.

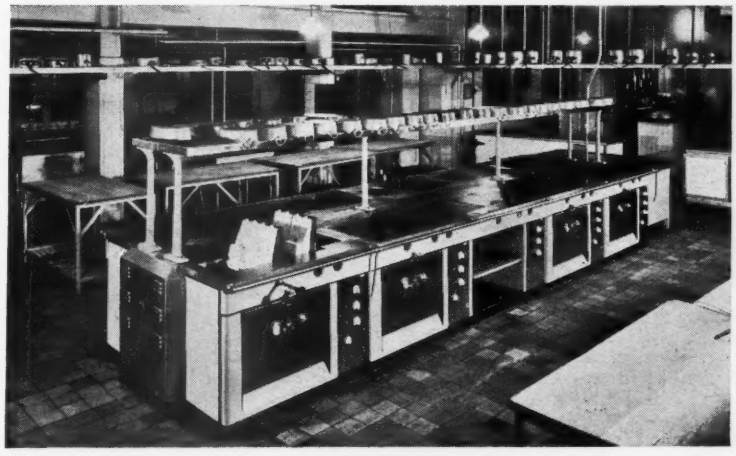
Both sides agreed that there had been a bona fide misunderstanding on the question of the wages "standstill." The employers understood that it applied to all claims which would increase production costs, while the unions believed that it was confined strictly to wages claims.

Electrical Engineers' Exhibition

Sir David Eccles, President of the Board of Trade, will open the Electrical Engineers' Exhibition to be held at Earls Court from 25th to 29th March next year. The demand for space has necessitated further expansion on the first floor, all of which will be in use for next year's exhibition. So far nearly 400 concerns have booked space and several exhibitors are taking advantage of the expansion by booking additional space on the first floor where they will show domestic equipment and lighting fittings, etc., retaining the ground floor stand for their heavier industrial gear. Displays of electricity in hospitals and covering education in the electrical field, careers and training, training in the Services, institutions and associations will be some of the attractions on the first floor.

School Cooking Installation

The heavy duty electric range (approximate loading 150 kW) recently installed by Benham & Sons, Ltd., at the Westminster Technical Institute, which has eight ovens, two boiling tops, bain marie hot closet, pot rack, etc., replaces the solid fuel range in the ground-floor kitchen. Apart from many special constructional details, the company has embodied a system of tilting electric boiling plates. This is a new type of mounting for hot-



Benham heavy duty cooking range at Westminster Technical Institute

plates which can be pivoted to a vertical position to allow easy access for cleaning and maintenance. The electrical connections to the boiling plates are contained in the "axles" and are thus protected from spillage. This principle was developed in Switzerland and this type of boiling plate is being manufactured in Great Britain under sole licence by Benham & Sons. A standard heavy duty electric range is being produced by Benham & Sons which will embody the tilting hotplates and other features that were introduced in the Westminster Technical Institute installation.

New G.E.C. Bristol Premises

The new branch premises of the General Electric Co., Ltd., in Bristol were formally opened on 21st November by the Lord Mayor of Bristol. Alderman P. W. Raymond.

The new premises of the Bristol Branch of the General Electric Co., Ltd.

Among those who attended the ceremony, at Magnet House, Victoria Street, was Mr. Leslie Gamage, M.C., chairman and managing director of the G.E.C.

The opening of the new premises, designed by the company's own Constructional Engineer's Department at Wembley, provides the Bristol Branch of the company with up-to-date offices, stores and showrooms, contemporary in design and providing capacity and facilities in keeping with the increasing requirements of serving the Bristol area. The need for this has been felt ever since 1940, when the premises which the branch had occupied for ten years were destroyed by enemy action. The new building has been erected on the site of the old premises; since 1940 the branch has been accommodated in premises in Lawford Street.

The Bristol branch was first established in 1909, with a staff of four on a single floor of a small building on Bristol Bridge. This development was largely an experimental one, since it was the first sub-branch to be set up as an offspring of the parent branch at Cardiff. Within two years the experiment had proved a success, and development of business brought a move to larger premises in Victoria Street. Two years later again, in 1913, it was decided to extend the area of the branch's activities beyond the city itself to cover parts of Gloucestershire, Somerset and Wiltshire. Continued expansion of business led to the move, in 1930, to the larger premises in Victoria Street, on the site of which the new Magnet House now stands.

Transfer of Ministry's Production Responsibilities

From 1st December production responsibility for builders' hardware, plumbers' hardware, cooking, heating and lighting equipment, and a number of allied materials will be transferred from the Ministry of Works to the Board of Trade. In this readjustment the aims have been to lessen the number of Government Departments with whom firms have to deal and to make the best use of technical advice in Departments. Wherever possible divisions of production responsibility have been re-shaped to correspond to divisions in industry.

The Ministry of Works will continue to be concerned with the problems of the building industry as a whole and will retain a general interest in all building materials and components.

"Production responsibility" is a technical term indicating the field of responsibilities of Government Departments in advising on general problems of trade, production, investment, etc., relating to particular industries. Functions include the collection of statistics, detailed exposition of Government policy, and critical examination of requests made by industry to the Government.

I.E.A. Exhibition

The Instruments, Electronics and Automation Exhibition to be held at Olympia, London, in April next year will be almost one-third larger in floor area than the 1957 exhibition. At the official ballot for stand positions, held at the Connaught Rooms on 15th November, it was stated that with more than sixty new exhibitors, the British Section is completely sold out, and the organisers have a waiting list for space. At a special exhibitors' meeting, held at the close of the 1957 exhibition, it was decided that the 1958 I.E.A. Exhibition should become international, and already in the overseas section stand space has been booked by exhibitors from Belgium, Denmark, France, Germany, Holland, Sweden, Switzerland and the United States. In addition to the trade associations who sponsored the 1957 exhibition—the British Electrical and Allied Manufacturers' Association, the British Industrial Measuring and Control Apparatus Manufacturers' Association, the British Lampblown Scientific Glassware Manufacturers' Association, the Drawing Office Material Manufacturers' and Dealers' Association, and the Scientific Instrument Manufacturers' Association of Great Britain—the Radio Communication and Electronic Engineering Association has joined in promoting the 1958 exhibition. There will again be a conference taking place at Olympia at the same time as the exhibition itself. It will be international in character. The exhibition is organised on behalf of the promoting trade associations by Industrial Exhibitions, Ltd., 9, Argyll Street, London, W.1.

Service Centre Competition

During the last three weeks more than 100 electricity service centres throughout the South West from Bristol to Penzance have been competing to present the story of electrical living. Displays have been judged on two main themes. Those in the windows told the story of thermostatic control while displays inside the service centres concentrated on home laundry equipment. The competition was divided into two groups, the larger service centres competing for the Frank Forrest silver trophy and the smaller service centres for the display challenge cup. Electricity House, Bristol, won the Frank Forrest trophy, Exeter being second and Plymouth third. Cornwall (Penzance) won the display challenge cup.

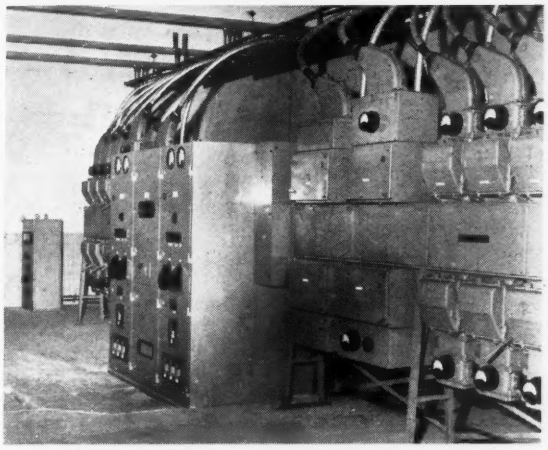
Prices of Materials

In the accompanying table we give the basis prices of the more important materials used in the electrical industry. The figures given are the selling prices and are those quoted on Tuesday last.

ALUMINIUM ingots	ton £197 0s 0d
COPPER, H.C. Electro	ton £184 0s 0d
Fire Refined 99·70%	ton £183 0s 0d
Fire Refined 99·50%	ton £182 0s 0d
COPPER Tubes ..	lb 1s 9½d
Sheet	ton £210 15s 0d
H.C. wire and strip ..	ton £233 5s 0d
LEAD, English ..	ton £79 15s 0d
Foreign	ton £78 0s 0d
MERCURY	flask £69 0s 0d
TIN, block (English) ..	ton £730 5s 0d
ZINC, G.O.B. Foreign	ton £66 15s 0d
Electrolytic	ton —
BRASS Tubes (solid drawn)	lb 1s 6d
Sheet	ton —
Wire	lb 2s 3½d
PHOSPHOR BRONZE Wire	lb 3s 6½d
PLATINUM	oz £31 0s 0d
RUBBER, No. 1 R.S.S. spot	lb 23½d—23½d

New Nigerian Textile Factory

Industrial progress in the Northern Region of Nigeria is typified by the new Kaduna textile factory which was officially opened by H.R.H. the Princess Royal on 22nd November. The factory has been set up, at a cost of over £1 million, by the Govern-



English Electric main and distribution switchgear at the Kaduna textile factory

ment in partnership with a leading British company, David Whitehead & Sons, Ltd., who have been appointed managing agents.

The factory is built on a 52-acre site and employs over 700 operatives who will produce about 12 million yards of Nigerian cloth (" baft ") every year.

"Energy and Man"

This is the theme of a special issue of the *Esso Magazine* (Esso Petroleum Co., Ltd., 36, Queen Anne's Gate, London, S.W.1). To its 48 pages well-known experts contribute articles on their special subjects. The various sources of energy are surveyed and water power, coal, oil, solar energy and nuclear power are accorded separate treatment.

E.T.U. Finances

A Special Rules Revision Conference of the Electrical Trades Union opens in London to-day (Friday). It is being attended by 50 delegates from England, Wales, Scotland and Northern Ireland and has been convened by the Executive Council as an effort to restore the depleted state of the Union's finances.

In the short period of eight years assets have fallen from just over £1 million to less than £400,000. The biggest single factor contributing to this decline has been the heavy incidence of dispute pay. During the six years from 1951 to 1956 strike payments cost the Union no less than £418,550. The peak in these years was reached in 1954, following the " guerrilla " strikes in the electrical contracting industry, when the Union paid out £165,764 in strike benefits.

When, in March this year, national strikes were called in the engineering and shipbuilding industries, the E.T.U. entered the struggle with sadly depleted resources. These strikes cost the Union about £200,000.

Stringent economies were resorted to, including the temporary closing down of the Union's convalescent home at Rustington, Sussex, and its residential college at Esher Place, Esher, formerly the home of Lord D'Abernon. But even these and other economies, the general secretary told delegates to the Union's annual delegate conference in June this year, were expected to do no more than reduce this year's deficit to £120,000.

The E.T.U.'s subscription is relatively low compared with the subscriptions of most craft unions. The last increase was in 1954, when the skilled contribution was raised from 1s 3d to 1s 7d. Among the proposals to be submitted by the Executive Council is one to increase the skilled contribution to 2s 3d a week, unskilled from 10d to 1s 2d, and the apprentice subscription from 5d to 7d. There are to be compensating increases in benefits. The conference is expected to last three days.

Ferranti Transformers for the United States

Ferranti, Ltd., have been awarded a contract valued at $3,925,250 by the Power Authority of the State of New York for thirteen generator transformers. The contract covers six 180,000 kVA, 13·2/240 kV 3-phase transformers and seven 180,000 kVA 13·2/120 kV 3-phase transformers for the Lewiston power station of the Niagara Power Project situated on the plateau of the Niagara River about three miles below the Falls in the town of Lewiston. The transformers will be of the forced-oil, forced-water cooled, inert gas-filled type and each will be directly coupled to a 167,000 kVA 3-phase generator. The transformers will each weigh approximately 183 tons (240 kV) and 155 tons (120 kV). Delivery is to commence in the middle of 1959 and be completed by the end of 1960.

This contract brings the total number of transformers supplied or under construction by Ferranti, Ltd., for the United States to 75 of a total capacity of nearly 5,000,000 kVA and a value of nearly $10 million.

Russian Railway Experts' Visit

A party of seven Soviet railway experts, led by Mr. Beshchev, Minister of Railways of the U.S.S.R., have arrived in London as the guests of the British Transport Commission for a three weeks' tour of British Railways. During their visit the Russian party will meet Sir Brian Robertson, chairman of the British Transport Commission. They will visit railway works and installations in all regions of British Railways. The programme will also include visits to London Transport and to some of the factories where equipment is being produced for British Railways. The party will include Messrs. Voronichev (mechanical engineer, chief of a department, Ministry of Railways); Tishchenko (electrical engineer, chief of a general department, Ministry of Railways); Simonov (deputy chief, Technical Council, Ministry of Railways); Naumov (chief civil engineer, Ministry of Railways); Mordvinkin (chief engineer of a department, Ministry of Railways); and Riazantsev (chief engineer, signalling and communication department, Ministry of Railways). The works to be visited include the English Electric Co., Ltd., at Preston and Newton-le-Willows; J. Stone & Co. (Deptford), Ltd., at Crawley and Deptford; and the Metropolitan-Cammell Carriage & Wagon Co., Ltd., at Saltley, Birmingham.

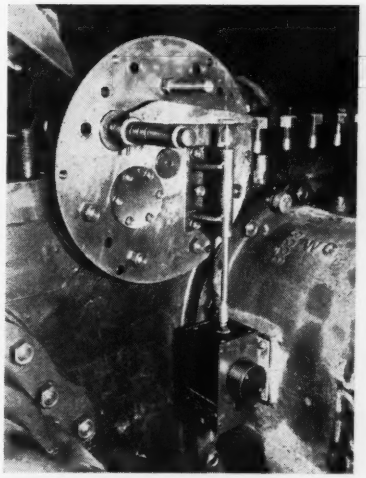
Kent Coast Electric Trains in 1959

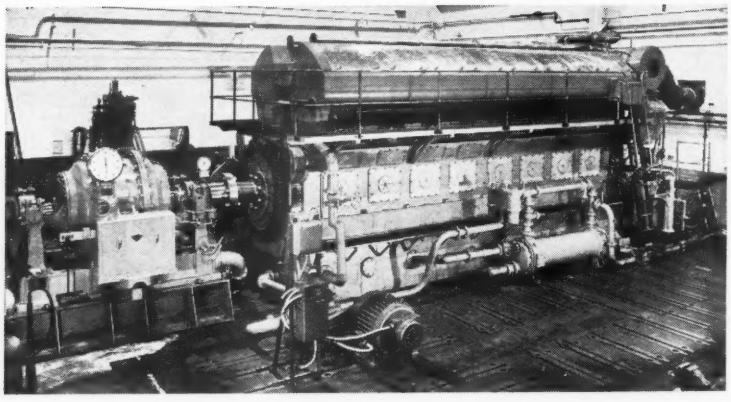
Sir Philip Warter (chairman of the Southern Area Board, British Transport Commission) with Mr. C. P. Hopkins (general manager) and a party of journalists travelled by train from Victoria to Sittingbourne last week to see the progress of earthworks along the route in connection with the electrification work now in hand. The work is running to schedule and when completed by June, 1959, the Victoria to Ramsgate services will be increased by about a third, and there will be new services from Charing Cross to Ramsgate, Dover, and Sheerness.

Generator Emergency Shut-down Device

A simple device is now being fitted to turbo-generators which provides a method of remotely and automatically shutting down the set in the event of an emergency. The mechanism consists of a Westool solenoid which is

Generator emergency shut-down equipment





The Mirrlees KVSS16 engine develops 4,128 h.p. at 428 r.p.m.

mounted on the turbine in a vertical position and can be controlled by a push-button in the station control room.

Pressure on the button energises the solenoid causing a plunger to shoot up and strike and trip a lever, thus causing the emergency steam stop valve to close.

This type of device is now being generally fitted to all turbo-generators manufactured by C. A. Parsons & Co., Ltd.

L.C.C. Schools Installations

Easco Electrical (Holdings), Ltd., has recently been awarded a contract by the London County Council for the manufacture and installation of twelve combined broadcast equipments and staff communication systems for installation in twelve new secondary schools. The installations will provide facilities for reception and relay of f.m./v.h.f. broadcast or a.m. broadcast on the long and medium wave bands. It also includes fire alarm generators and priority microphone announcements, with automatic class-change signals and a means of intercommunication for the staff from certain strategic positions to a control point. The number of loudspeakers to be provided at the various schools varies from 40 to 160.

Mirrlees' Jubilee

It is just sixty years since Mirrlees, Bickerton & Day, Ltd., built the first British diesel engine and fifty years since they established their works in Stockport, where on Monday last jubilee celebrations took place. On this occasion the new 4,128 h.p. KVSS16 engine was shown publicly for the first time. This is a 16 cylinder engine with two banks of eight cylinders at an included angle of 45 deg. The bore and stroke are 15in and 18in respectively and the engine is supplied either naturally aspirated or in the exhaust turbo-charged condition.

The engine is of robust construction and follows Mirrlees standard practice in that the scantlings are well in excess of classification societies' requirements, thus ensuring a long and trouble-free life under arduous conditions with a low fuel consumption.

Works Visit

Mr. Teng Chao-ming, Secretary General of the Chinese Economic and Trade Mission, visited the Wolverhampton works of John Thompson, Ltd., on 19th November, to discuss trade prospects with the company's directors. He was met by Mr. J. H. N. Thompson, Mr. D. L. Murray and Mr. E. Phillips. After the reception Mr. Chao-ming attended a technical discussion on the pressure vessel which John Thompson is building for the Berkeley nuclear power station reactor, and he also made an extensive tour of the company's factories.

Duke at Guided Weapons Establishment

Last Friday the Duke of Edinburgh visited the Ferranti Guided Weapons Establishment at Wythenshawe where he saw some of the work involved in the guidance and control of the joint Bristol/Ferranti "Bloodhound," the first ground-to-air guided weapons system to be put into production in the United Kingdom. Sir Vincent de Ferranti, chairman of Ferranti, Ltd., welcomed His Royal Highness and Dr. N. H. Searby, manager of the Establishment, conducted him round the laboratories and workshops. Afterwards the Duke unveiled a plaque to commemorate the visit.

New Service Centre

A new service centre has been opened by the Eastern Electricity Board on the ground floor of a block of flats at Farnham Road, Harold Hill Estate, near Romford in Essex. The centre has frontages to the main street and to an arcade and, despite the restricted floor area, there is a great deal of window space for the display of domestic apparatus. Electric floor warming employing Pyrotenax cable has been installed and the surface finish is "granwood" flooring. Fluorescent lighting in roof panels provides adequate lighting and the colouring of the walls and fittings is sensitive yet exhilarating. Accounts can be paid at the new service centre which will provide the full range of services offered over the Board's area. The building was designed by Mr. J. W. Lee, A.R.I.B.A., A.M.T.P.I., the Board's architect.

Elliott-Automation Acquisition

Elliott-Automation, Ltd., announces that it has purchased the entire share capital of Rotameter Manufacturing Co., Ltd., in consideration of the allotment of 269,000 ordinary shares of 5s each in Elliott-Automation, Ltd. Rotameter are leading manufacturers of variable area flowmeters and density meters. Their products represent an important addition to the Elliott-Automation group's range of instrumentation and will further widen the scope of the group's service to process industries. Rotameter will remain under its present management with Mr. H. R. Trost and Mr. A. H. Trost as joint managing directors and Mr. F. C. Whalen as technical director, and the business will continue to operate from its Croydon works.

Fairey Company Joins Atomic Group

It was announced last week that the Fairey Aviation Co., Ltd., had become a full member of Atomic Power Constructions, Ltd. Other members are Crompton Parkinson, Ltd., Elliott Brothers (London), Ltd., International Combustion (Holdings), Ltd., Richardsons, Westgarth & Co., Ltd., and Nuclear Civil Constructors. Mr. G. W. Hall, chairman and managing director of the Fairey Aviation Co., is joining the board of the group.

Trade Announcements

The **Nelson Engineering Co., Ltd.,** is now at the London office of Veritys, Ltd., Brettenham House, Lancaster Place, W.C.2 (telephone: Temple Bar 3835-6).

Mr. G. M. Luckham has joined the staff of the domestic appliance division of the **English Electric Co., Ltd.,** as sales representative in the Birmingham and Worcester Sub-Areas of the Midlands Electricity Board, and Mr. J. L. Welch, who has been working as a representative from the company's Cardiff office, is now appointed junior sales representative in South Wales.

Wordrew, Ltd., 173, Princess Street, Manchester, have been appointed sole agents in the North of England for the Hilti rapid fastening tool manufactured by the Hilti Tool Co., Ltd., of Switzerland.

Thomas French & Sons, Ltd., Chester Road, Manchester, 15, have appointed Mr. N. D. Harrison, of Northwich, Cheshire, as their electrical representative for the North of England and Scotland.

OVERSEAS ELECTRICAL TRADE

EXPORTS IN OCTOBER LESS THAN LAST YEAR

WHILE there was a slight improvement in British electrical exports in October as compared with September, the figures published in the Board of Trade returns show a falling off of nearly £1½ million as compared with October last year. The total last month was £17,753,437, as compared with £17,026,986 for the preceding month and £19,145,729 for October, 1956. Nearly all the main groups of electrical goods showed decreases in value when compared with the corresponding period of last year, the one exception being telegraph and telephone equipment which at £1,758,869 showed a slight improvement.

The value of exports of generating sets, generators and motors was £2,800,705 (£3,050,412 in October, 1956), and of converting machinery, mercury-arc rectifiers, transformers, switchgear, etc., £2,195,583 (£2,432,567). Radio equipment at £3,051,775 compares with £3,279,776 in October, 1956, and cables and wires were about £300,000 less at £2,361,821.

The best market for generating plant in October was Australia which made purchases valued at £381,826. South Africa was the next customer in importance taking goods valued at £254,400, and India was third with

TABLE I.—ELECTRICAL EXPORTS

Class	1957	Ten months ended 31st October 1956	1957
	£	£	£
Generating sets and generators:			
Diesel-driven, up to 10 kW	126,632	1,438,473	1,446,579
Ditto, 10 to 65 kW	181,055	1,434,387	1,697,241
Ditto, 65 to 200 kW	79,672	1,290,020	1,155,514
Ditto, over 200 kW	451,416	2,989,905	3,322,735
Spark ignition engine driven	16,165	294,953	174,029
Steam turbine driven	28,493	1,084,747	679,088
Hydraulic turbine driven	—	51,786	79,167
Other prime mover driven	10,279	524,676	240,522
Generators, not exceeding 200 kW	138,629	1,227,905	1,560,416
Ditto, over 200 kW	159,390	784,302	1,339,899
Parts of generators	309,885	4,938,332	3,604,388
Motors, complete, other than railway, tramway and trolley-bus:			
Up to ¼ h.p.	217,312	1,914,153	1,955,100
Over ¼ but under 1 h.p.	67,481	555,805	501,137
1 h.p. to 250 h.p.	451,202	4,181,575	4,712,095
Over 250 h.p.	100,672	726,795	1,332,972
Railway, tramway and trolley-bus motors complete and parts of all motors	141,427	1,589,582	2,008,311
Motor starting and controlling gear	320,995	2,388,404	3,272,574
	2,800,705	27,415,800	29,081,767
Converting machinery	11,031	311,898	448,175
Mercury-arc rectifiers	170,610	711,902	1,237,754
Transformers for lighting, heating and power (incl. coils):			
Not exceeding 7,500 kVA	445,803	10,207,978	5,972,837
Over 7,500 kVA	280,961		2,787,239
Switchgear and switchboards (not telegraph or telephone), up to 200 A and 660 V	398,799	2,851,554	3,632,707
Ditto, other	888,379	11,357,702	11,560,776
	2,195,583	25,441,034	25,639,488
Primary batteries:			
Lighting	90,680	834,905	991,891
Radio	233,539	2,583,202	2,442,149
Other	21,016	426,118	399,068
Parts (excl. carbons)	63,282	381,180	563,822
Lamps:			
Filament, exceeding 28 V*	85,854	983,048	899,983
Ditto, under 28 V*	24,801	306,912	288,587
Arc lamps and searchlights	6,952	200,589	122,504
Discharge lamps, fluorescent tubes, etc.	111,154	737,806	938,326
Radio and television, etc., apparatus:			
Thyratrons, hot cathode mercury vapour and gas-filled rectifiers (excl. mercury arc rectifiers), photo-electric cells, stabilising and cold cathode valves, magnetrons, klystrons	13,886	253,756	217,032
All other	350,572	2,521,868	2,940,950
Parts (excluding glass bulbs)	23,300	105,473	135,889
Radio and television transmitters	92,202	923,909	601,541
Commercial radio and radar equipment	1,362,899	12,681,478	12,960,258
Domestic radio receivers, mains	90,361	1,318,342	1,080,007
Ditto, battery	61,302	724,612	554,431
Ditto, other (incl. car)	23,843	242,302	270,800
Radiograms	37,014	355,659	320,662
Television sets	74,549	444,449	556,531
Public address equipment	84,700	845,465	921,153
Other radio and television apparatus, n.e.s.	33,382	353,375	407,711
Components and parts, n.e.s.	803,765	6,962,517	7,949,102
	3,051,775	27,733,205	28,916,067
Telegraph and telephone installations	722,250	6,023,986	7,312,395
Telephone instruments, separately consigned	113,436	1,413,297	1,491,133
Telegraph and telephone parts	725,202	6,384,823	7,884,676
Line apparatus for long distance commun.	197,981	2,153,062	2,019,850
	1,758,869	15,975,168	18,709,054

Class	1957	Ten months ended 31st October 1956	1957
	£	£	£
Cookers	83,960	766,461	645,555
Toasters	40,272	281,865	219,742
Other cooking apparatus	41,653	360,090	330,662
Parts and accessories	64,139	791,162	650,645
Space heating appliances	67,705	357,459	353,921
Water heating appliances	32,180	333,258	319,548
Other heating appliances	17,119	360,692	329,127
Parts and accessories	57,878	636,142	557,063
Irons	109,006	932,361	778,435
Arc welding equipment, a.c.	44,826	529,414	510,895
Ditto, d.c.	41,059	433,955	437,866
Resistance welding equipment	28,330	174,226	225,314
Electric furnace plant	31,082	577,080	757,926
Magnetos, ignition	23,380	273,783	225,935
Sparking plugs	200,141	1,700,490	1,625,213
Elec. appliances for aeroplanes, n.e.s.	299,473	2,136,400	2,698,376
Ditto, for motor vehicles, n.e.s.	335,850	3,590,778	3,411,784
Ditto, for cycles, n.e.s.	30,010	599,260	549,427
Signalling app. (incl. traffic signals)	146,496	672,873	1,206,811
Instruments, commercial	132,210	1,735,944	1,668,986
House service meters (including parts)	140,330	1,702,532	1,428,328
Electro-medical apparatus (not X-ray)	25,804	422,674	377,565
X-ray apparatus (excl. tubes and valves)	69,793	644,822	722,646
Vacuum tubes	26,785	284,704	411,322
Ceiling fans, complete	29,533	1,044,147	1,051,307
Desk fans, complete and parts of desk and ceiling fans	54,810	390,008	407,316
Vacuum cleaners	149,702	1,439,168	1,472,695
Floor polishers	81,949	753,620	865,369
Food mixers	77,185	613,942	529,082
Hair clippers and dry shavers	64,644	743,746	695,767
Other portable appliances	22,598	291,604	262,229
Parts	136,778	1,119,061	1,352,195
Portable elec. tools (not saws) and parts	230,560	2,199,207	2,162,854
Cables and wires:			
Telegraph and telephone, submarine	76,189	1,687,117	4,266,234
Ditto, other	765,158	8,330,963	9,367,291
Cotton, silk or art. silk insulated	27,112	495,847	358,832
Enamel, glass or asbestos insulated	90,370	1,005,223	914,513
Paper insulated	581,792	9,016,692	7,559,565
Rubber insulated	456,791	5,313,203	5,336,228
Thermoplastic insulated	187,167	1,436,326	1,879,654
Other	177,242	2,153,356	1,721,382
	2,361,821	29,438,727	31,403,699
Accumulators for motor vehicles	132,411	1,582,253	1,524,914
Ditto, traction	23,293	279,734	273,514
Ditto, radio and other portable	27,646	859,387	627,923
Ditto, other	15,629	668,044	314,216
Parts and accessories	73,689	961,246	823,868
Elec. porcelain, etc. (incl. insulators), n.e.s.	92,992	1,121,302	1,005,180
Insulating cloth and tape	50,931	618,290	554,507
Other insulating material	101,847	1,007,072	949,059
Permanent magnets	59,214	458,919	518,726
Radio, telegraph and telephone testing equip., n.e.s.	70,324	424,878	643,939
Scientific elec. instruments (not telegraphic or telephonic):			
Time recorders and time switches, complete	19,387	146,986	122,979
Other	290,178	2,176,870	3,016,662
Electrical machinery, n.e.s.	92,501	1,129,914	937,053
Electrical apparatus and appliances, n.e.s.	960,124	7,977,779	9,167,618
TOTAL	17,753,437	180,763,296	190,117,469

* The figures for 1957 are not completely comparable with those for previous years.

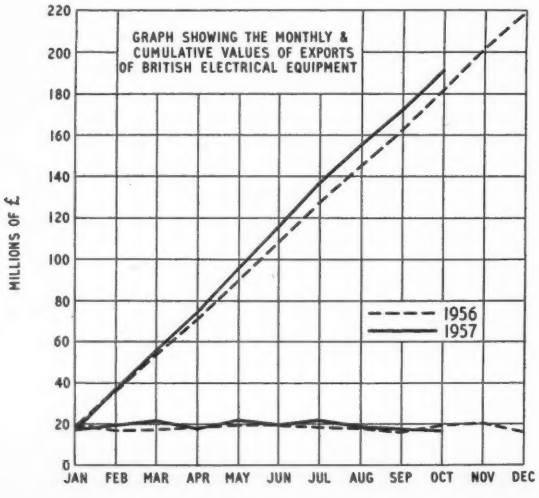
TABLE II.—DISTRIBUTION OF EXPORTS OF ELECTRICAL MACHINERY, APPARATUS AND APPLIANCES

Country	October, 1957	Ten months ended 31st October 1956	Ten months ended 31st October 1957	Country	October, 1957	Ten months ended 31st October 1956	Ten months ended 31st October 1957
	£	£	£		£	£	£
Channel Islands	125,501	752,000	931,237	Western Germany	226,059	1,745,880	2,092,599
Gibraltar	49,743	382,618	207,177	Netherlands	631,682	6,448,313	6,664,867
Malta and Gozo	100,959	683,114	612,778	Belgium	290,664	2,867,446	3,076,634
Cyprus	136,221	1,343,700	1,292,711	France	239,952	3,553,921	3,546,757
Sierra Leone	41,016	253,286	359,616	Switzerland	120,249	995,511	1,218,758
Gold Coast	95,434	1,391,632	1,630,472	Portugal	228,801	1,666,493	2,748,662
Nigeria	291,545	2,847,958	2,743,712	Spain	161,879	3,950,690	3,336,282
Union of South Africa	1,495,424	12,899,204	14,689,433	Italy	262,133	2,806,739	3,289,599
Rhodesia and Nyasaland	458,289	5,003,427	4,949,659	Austria	45,639	382,982	402,825
Tanganyika	50,596	532,368	725,289	Yugoslavia	50,494	462,230	535,613
Kenya	148,046	2,357,626	2,266,026	Greece	89,974	2,172,025	1,207,928
Uganda	69,853	713,234	826,003	Turkey	119,618	693,179	738,873
Mauritius	24,306	227,330	345,452	Belgian Congo	47,807	286,728	456,242
Aden	31,319	464,987	444,894	Portuguese East Africa	13,621	222,648	273,863
Bahrain, Qatar and Trucal States	52,608	872,626	1,374,008	Egypt	88,135	1,650,905	133,602
Kuwait	87,836	1,361,830	2,669,844	Libya	73,365	270,176	382,905
India	1,665,957	18,024,635	19,016,290	Southern Morocco	25,567	437,140	346,382
Pakistan	189,319	3,063,750	2,527,079	Sudan	73,520	725,026	1,020,260
Singapore	338,751	3,079,530	3,334,520	Syria	13,164	680,003	271,735
Federation of Malaya	215,604	2,738,341	2,765,486	Lebanon	40,238	583,453	433,648
Ceylon	149,330	1,871,691	1,469,661	Israel	46,231	876,536	585,033
British North Borneo	24,198	237,824	241,631	Jordan	1,066	517,583	494,015
Sarawak	9,511	152,811	211,616	Saudi Arabia	37,963	1,219,816	468,931
Hong Kong	230,553	2,252,981	2,478,340	Iraq	150,792	2,952,864	2,388,858
Australia	1,793,655	18,424,444	17,139,138	Iran	318,056	1,796,019	3,559,561
New Zealand	1,073,886	8,662,639	9,660,415	Burma	89,239	1,128,238	979,327
Fiji	12,429	215,003	168,710	Thailand	67,457	873,041	870,262
Canada	1,033,086	10,947,665	10,831,210	Indonesia	37,452	515,173	478,543
Jamaica	132,255	973,045	1,094,742	Japan	54,800	661,372	714,933
Barbados	14,757	237,394	172,171	United States of America	944,090	7,655,335	11,337,232
Trinidad	125,884	997,889	1,120,421	Cuba	69,299	358,619	630,850
British Guiana	44,278	384,649	425,524	Mexico	35,906	714,062	543,887
Other Commonwealth countries	131,832	903,008	1,163,714	Colombia	62,338	780,249	557,409
Irish Republic	256,768	2,864,900	2,248,164	Venezuela	274,538	2,634,345	2,968,130
Soviet Union	174,645	2,173,973	1,901,120	Peru	44,887	539,282	564,849
Finland	148,687	1,506,054	1,375,630	Chile	34,189	335,780	424,788
Sweden	460,188	3,410,026	3,998,866	Brazil	141,508	1,523,960	1,025,402
Norway	208,402	2,155,687	2,198,708	Uruguay	24,418	101,412	225,506
Iceland	10,488	145,433	158,226	Argentine Republic	158,200	773,946	1,321,388
Denmark	174,239	1,886,401	1,835,399	Other foreign countries	308,215	2,530,569	3,672,018
Poland	132,834	276,894	523,421				
				TOTAL	17,753,437	180,763,296	190,117,469

£240,186. In the converting machinery, mercury-arc rectifiers, etc., group India easily maintained its lead with purchases of £526,641, the next in order of importance being South Africa with £271,460 and Canada with £236,320.

Canada, which bought equipment valued at £244,694 in October, led in the radio apparatus group, followed by the Netherlands (£216,786), the United States (£213,149), Australia (£203,293) and India (£200,959). The principal markets for telegraph and telephone material were Australia (£306,327) and South Africa (£228,631). In the cables and wires class India was the best market with purchases of £393,666. The United States stepped into second place, taking material valued at £326,090, while New Zealand was third with £211,643.

Table I analyses the electrical exports while Table II shows their destinations.



Other electrical equipment covered by the returns, but not shown in the electrical section, includes the following:

Electrically operated washing machines, complete, not exceeding 150 lb net weight: October, £349,170; ten months, £2,818,309 (against £2,967,945). Ditto, 150-250 lb: October, £73,501; ten months, £961,907 (£1,037,882). Parts: October, £49,530; ten months, £578,279 (£695,037).

Electric locomotives: October, £203,832; ten months, £3,155,190 (£2,278,805).

Locomotives with i.c. engines and electrical transmission: October, £205,482; ten months, £2,806,054 (£7,528,651).

Welding electrodes (excluding carbon), covered: October, £81,210; ten months, £1,134,367 (£1,120,654).

Electric conduit tubes and cased tubes: October, £46,899; ten months, £708,695 (£721,536).

Electric carbons (including parts): October, £49,847; ten months, £538,333 (£495,371).

Electric lighting fittings and lanterns, complete, with or without bulbs (excluding arc lamps, searchlights and cycle lamps): October, £198,468; ten months, £2,037,728 (£1,444,230).

Other electric lighting appliances (excluding vacuum tubes and lamp bulbs) and fittings and parts n.e.s.: October, £182,440; ten months, £2,253,237 (£3,224,321).

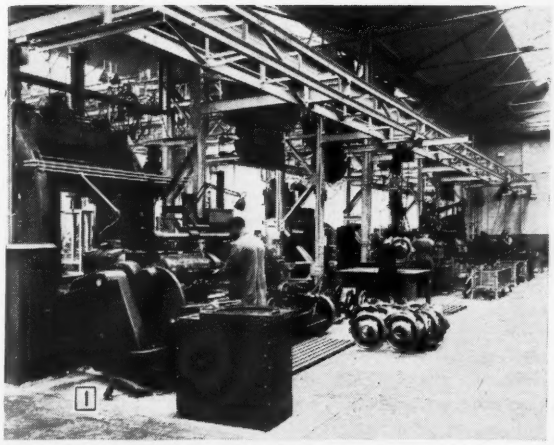
Imports of electrical goods during October totalled £2,606,091, as compared with £2,224,879 in September and with £2,224,590 in October, 1956. The total for the ten months of this year of £22,017,943 compares with £19,619,941 for the corresponding period of 1956. The three leading importers were the United States (£641,075), Western Germany (£474,662) and the Netherlands (£455,382).

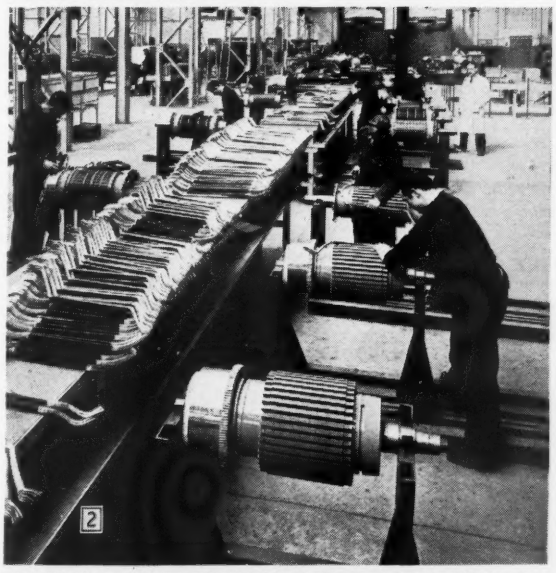
Indian Steelworks Extension

Jointly with a number of United States and Canadian banks, the World Bank has made a loan of £11,600,000 to the Tata Iron & Steel Co. of India to assist in financing an expansion programme which will double the company's ingot capacity.

Traction Motor Production

General view of the Dudley Port Works





Specialist Factory at Dudley Port

SOME time ago the General Electric Co., Ltd., decided in view of the increase in its electric traction business to set up a factory for the special purpose of making traction motors and generators which had hitherto been produced at its Witton Works. Accordingly the company acquired a group of buildings at Dudley Port within easy reach of Witton. After some necessary reconstruction the company has a well laid out factory with a floor area of about 80,000 sq ft now in active production. The present capacity is for about £1 million of equipment a year and it is expected eventually to double this output.

At a Press inspection last week an opportunity was given us to see the works in action. Ample space exists for all the processes and the layout is very advantageous. The raw materials, including stampings from the Witton Works, go into a stores whence the castings go to a large machining department, the stampings to a core-building section and the commutator components and armature coils to other departments for assembly.

At one end of the armature winding bay there are electronic balancing machines, fault testing machines and commutator " seasoning " equipment. Each complete armature is balanced and tested before going to the assembly section.

The comprehensive machining equipment includes a planer, planomiller, vertical and horizontal borers, automatic, capstan, turret and copying lathes, radial drillers, slotters and shapers. Two 100-ton hydraulic presses are installed in the core-building section. But although production is mechanised as far as possible considerable reliance has to be placed upon manual skill, particularly in the insulation and winding of the armatures.

The handling equipment includes overhead travelling cranes supplemented by jib cranes at strategic points. For lifting components in the machine tool bay the company has devised a system of 5 cwt hoist blocks on monorails supported on overhead channels in such a way that the hoist block can be traversed both across and along the machine tool area. Full use is made of fork trucks for moving components around the works.

The test department is designed to handle a weekly output of fifty main driving motors with ancillary motor-generator and exhauster sets, and it can deal with main generators up to 800 kW for diesel-electric sets. Each of the four main test beds has its own test panel and forced-ventilation air supply. Only one operator is needed for

1. *Part of the machine bay, showing special monorail hoists.* **2.** *Armature winding.* **3.** *Assembly bay*

Each of the test beds has its own test panel and forced-ventilating air supply

running a test. Power is supplied by four motor-generator sets in an adjoining substation. Each consists of a driving motor directly coupled to two generators, one giving a high-voltage supply and the other a heavy-current l.v. supply. Back-to-back methods of testing are employed so that only the losses have to be supplied. The peak demand is thus kept down to 500 kW maximum.

Power is taken from the Midlands Electricity Board's system (7,000 V two-phase three-wire). Two Scott-connected transformers, one of 6,000 kVA for the works and the other rated at 800 kVA for the test department, convert the supply to 440 V three-phase three-wire.

The transformers and their associated switchgear are housed in the works substation.

The heating and ventilating system is designed to maintain a temperature of 65 deg F with an outside temperature of 32 deg, while providing two air changes an hour. Projector type unit heaters are supplied with hot water from two oil-fired boilers. Convector heaters are installed in the offices. The works lighting is by 400 W h.p. mercury vapour fluorescent lamps giving an illumination of 12 to 15 lumens on the working plane. The total lighting load is 55 kW.

At a luncheon following the tour of the works Mr. J. J. Gracie, director and general manager of the Witton Works, said that the G.E.C. was able to undertake all the electrical work connected with electric traction, including the signalling, cabling and overhead work. It did not make the rolling stock but it had arrangements with locomotive and carriage builders which enabled it to quote for complete schemes. Questions were asked about future developments and replies were made by members of the works management. It was stated that much work was being done on the development of selenium and germanium rectifiers although in the meantime mercury-arc rectifiers, which had been well proved in service, would continue to be used. While d.c. motors were considered to be the best machines available at present it was not denied that in the future a.c. motors might be satisfactorily employed, with suitable gearing.

Canadian Trade Mission

LAST Friday a Canadian Trade Mission arrived in this country for a round of visits lasting until 18th December. The Mission is the outcome of the recent talks in Canada between Canadian Ministers and the United Kingdom Chancellor of the Exchequer and the President of the Board of Trade. Heading the mission are the Hon. Gordon Churchill, Minister of Trade and Commerce, and Mr. J. S. Duncan, chairman of the Hydro-Electric Power Commission of Ontario. The members include Mr. R. J. Askin, vice-president, Abitibi Power & Paper Co., Ltd.; Mr. W. L. Hutchison, vice-president, Moffats, Ltd.; Mr. J. D. Leitch, president, Toronto Elevators, Ltd.; Mr. H. V. Lush, president, Canadian Manufacturers' Association; Mr. I. F. McRae, vice-president, Canadian General Electric Co.; Mr. H. Sissons, assistant general manager, Hydro-Electric Power Commission of Ontario; Mr. D. M. Stephens, president and general manager, Winnipeg Electric Co.; Mr. J. B. White, vice-president and general manager, Aluminum Co. of Canada, Ltd.; and several representatives of other engineering interests.

The Commission's object is in fulfilment of the intention of the Canadian Prime Minister, Mr. Diefenbaker, to divert 15 per cent of Canadian purchases from the United States to other suppliers—in particular Great Britain. During their tour, which is purely exploratory, the members will gather information about what British industry is doing, to impart to their countrymen, and impress United Kingdom manufacturers with the opportunities open to them in the expanding Canadian market.

Among the works which will be inspected are Calder Hall, the Berkeley nuclear power station (in course of erection), and the establishments of the Steel Co. of Wales, Joseph Lucas, Ltd., the General Electric Co., Ltd., Bruce Peebles & Co., Ltd., the Harland Engineering Co., Ltd., Babcock & Wilcox, Ltd., Richard Johnson & Nephew, Ltd., the Metropolitan-Vickers Electrical Co., Ltd., British Insulated Callender's Cables, Ltd., Ferranti, Ltd., the English Electric Co., Ltd., Mirrlees, Bickerton & Day, Ltd., Brook Motors, Ltd., B. S. & W. Whiteley, Ltd., David Brown & Sons (Huddersfield), Ltd., and the British Thomson-Houston Co., Ltd. (Larne Works).

Mr. J. S. Duncan, who arrived in advance of the main party on 20th November, said at a Press conference that there was in Canada a great fund of goodwill for British goods but long delivery periods were a source of difficulty; there were few complaints about prices or quality. He thought the United Kingdom manufacturers would find it worthwhile to give Canadian customers some preference on the matter of delivery. Mr. Duncan reminded his audience that as Canadians had become accustomed to American styles, goods designed for the United Kingdom might not always be acceptable and good after-sales service was an American attribute which United Kingdom manufacturers should copy.

As an example of British manufacturers' ability to secure Canadian orders he quoted the award of a contract a day or two earlier to C. A. Parsons & Co., Ltd., by his Commission for turbo-generating plant to the value of £4 million. Mr. Duncan said that there was a probability of orders for such plant worth £17 million being placed during the next three or four years and there was a good chance there for British firms.

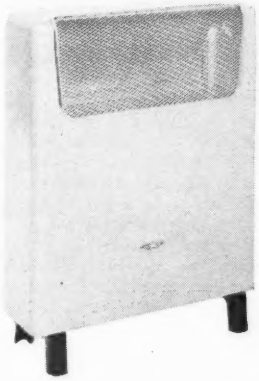
NEW ELECTRICAL EQUIPMENT

Airing Cupboard Heater

A rectangular shaped electric heater suitable for screwing to the wall of an airing cupboard, or similar location, has been placed on the market by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2. An expanded metal safety guard covers its 100 W mica wound heating element, which is mounted on a sheet metal frame. Entry for the supply cable is provided in the underside of the frame. The heater is 15⅜in in length by 3¾in wide by 3 5/16in deep and models are available for the 200/220 and 230/250 voltage ranges. The price is £1 7s 6d plus 12s purchase tax in the United Kingdom.

Convector Heater

The HOTPOINT ELECTRIC APPLIANCE CO., LTD., Crown House, Aldwych, London, W.C.2, has introduced a thermostatically controlled 2 kW convector heater which is available in the same voltage ranges as the switched model (200/220 and 230/250). The finish is either in bronze (Cat. No. 6025) or in silver-grey (Cat. No. 6026) and the price of the heater is £8 15s 1d plus £3 16s 11d purchase tax in the United Kingdom.



Hotpoint thermostatically controlled convector heater

Electric Kettles

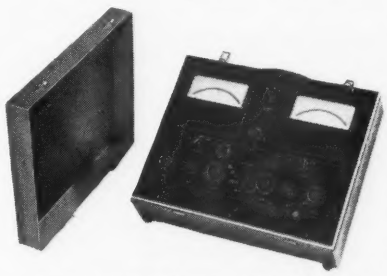
A further announcement from Hotpoint states that the "Torribar" sheathed wire element is now being fitted to the Premier "Pylon" range of kettles in place of the wound type, manufacture of which has ceased. This element will also be supplied complete with shrouded ring at a price of £1 16s when replacement spares are required.

All "Pylon" kettle prices are standardised irrespective of their loading, 1 kW, 1½ kW or 2 kW. The prices are as follows: Copper chrome, 3 pt, £3 19s 6d (plus 17s 6d purchase tax); copper chrome, 4½ pt, £4 10s 6d (plus 19s 11d); polished copper, 3 pt, £3 19s 6d (plus 17s 6d); aluminium, 3 pt, £2 17s 6d (plus 12s 8d); anodised aluminium, 3 pt, £3 12s (plus 15s 10d).

Multi-Combination Test Set

A new test set known as the Mark II has recently been introduced by METAL & PIPELINE ENDURANCE, LTD., Artillery Mansions, Victoria Street, London, S.W.1. The set incorporates in one robust case approximately 18in by 12in by 6in deep all the measuring instruments normally required for field testing in electrolysis and corrosion investigations and cathodic protection testing. Time normally wasted in connecting and disconnecting from a number of separate instruments is eliminated by virtue of the fact that many types of electrical measurements can be made merely by the turn of a selector switch.

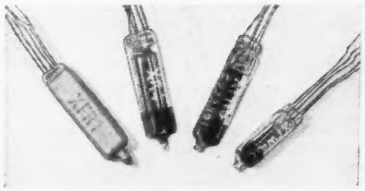
The test set comprises a low resistance millivolt/voltmeter, a high resistance voltmeter and a d.c. biasing potential which can be used in series with it, a potentiometer voltmeter and a milliamp/ammeter. The instrument scales are hand calibrated and are drawn to match the current characteristics of each instrument.



Mark II multi-combination test set (Metal Pipeline Endurance, Ltd.)

Directly Heated Sub-Miniature Valves

An augmented range of directly heated sub-miniature valves, many of which are exact equivalents of American types used in portable radio communication equipment, are now being marketed by HIVAC, LTD., Stonefield Way, Victoria Road, South Ruislip, Middx. The range includes the XFY14 output pentode (U.S. equivalent 5672); the XFR1 r.f. amplifier pentode (U.S. equivalent 1AD4); the XFR3 r.f. oscillator triode (U.S. equivalent 5676); and the XR4 r.f. power amplifier (U.S. equivalent 6397). All the valves, with the exception of the XR4, are 38·1 mm long, 10·1 mm wide and 7·6 mm in thickness. The filament voltages are 1·25. The XR4 is 40·64 mm long and has a diameter of 10·16 mm. The r.f. amplifier pentodes have metallised screening. Many of the valves are being exported to the United States.



A selection of Hivac directly heated sub-miniature valves

Universal Bridge

The introduction by MARCONI INSTRUMENTS, LTD., St. Albans, Hertfordshire, of a new version of the universal bridge TF868/1 has recently been announced. Whilst retaining the advantages of the TF868/1 the new instrument, known as type TF868A, incorporates a bridge-volts monitoring system.

For inductance or capacitance measurements, the measuring bridge is energised by an a.c. voltage derived from a valve oscillator. If desired, this voltage can be set to a definite required value. For this purpose there is a continuously variable L & C bridge volts control, a 0-10 V auxiliary scale on the panel meter, and a Read L & C bridge volts switch. The inclusion of this new facility is especially useful when measurements are being made on components such as iron-cored coils whose inductance is a function of exciting current.

The new bridge measures values of inductance from 1 μH to 100 henrys, capacitance from 1 $\mu\mu$F to 100 μF and resistance from 0·1 ohm to 10 MΩ. Inductance or capacitance measurements can be made at either 1 or 10 kc/s; resistance measurements are made at d.c. Bridge networks, precision standards, a.c. and d.c. bridge supplies, an amplifier-detector for a.c. balance determination, and a centre-

Marconi type TF868A universal bridge

zero galvanometer for d.c. are all combined in one mains operated functionally designed instrument.

Projector Lamp

A fundamentally new type of projector lamp for use with 8 mm projectors has been introduced by PHILIPS ELECTRICAL, LTD., Century House, Shaftesbury Avenue, London, W.C.2. Known as type 13113C/01, it is an 8 V 50 W lamp with an elliptical mirror incorporated in the bulb. The filament is of small dimensions and is located at the principal focus of the mirror. When the lamp is used with an 8 mm projector, the secondary focus of the mirror occurs in the position of the gate, so that an image of the filament is produced on the gate area. The screen illumination is claimed to be at least the equivalent of a 500 W lamp in a conventional projector, with only about one-tenth of the heat. The lamp is priced at £1 15s.

Electric Kettle

A lid-less type electric kettle, the "Paramount," is now being produced by A. D. DAVIDSON ELECTRIC CO., 62, Granville Street, Birmingham, 1. It has a chromium-plated copper body and the handle, of plastic, is easily renewable. The capacity is 3 pt but as little as ½ pt of water can be boiled without damage to the kettle as the element is fitted very near to the base.

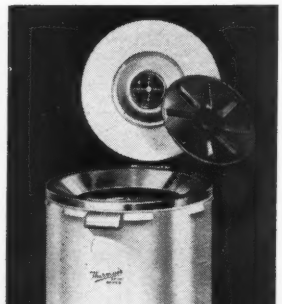
Other features include a concealed inlet socket, which enables a flat type connector (B.S. 562) to be used, and an automatic protective device which does not eject the connector if the kettle is boiled dry. Instead the thermostatically protected element switches off the current and as soon as more water is placed in the kettle it is again ready for use.

The kettle is available in two loadings, 1,500 W (K 808) and 2,000 W (K 809), and the prices are £3 10s and £3 12s plus 15s 4d and 15s 9d, respectively, for purchase tax in the United Kingdom.

Heated Spin Dryer

A new spin dryer, the "Thermair," claimed to be the first of its kind to be electrically heated, is now being distributed by the BRATTEL ELECTRIC CO., LTD., 27, Old Bond Street, London, W.1. When in operation air is drawn through ducts in the lid of the machine and passes over a 1 kW heating element. Warm air is then circulated through the centre of the clothes container, finally escaping through holes in the top of the outer container.

The clothes to be dried are totally enclosed and when the lid is raised the clothes container is automatically switched off and a brake applied. It holds up to 25 lb of wet washing (6 to 7 lb dry weight). The perforated aluminium inner container has a shaft running through it, the lower end of which is directly connected to a motor



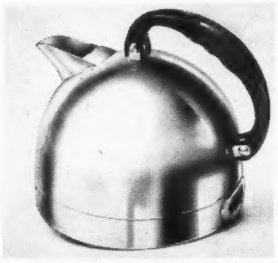
"Thermair" heated spin dryer

which revolves at 1,425 r.p.m. The other end of the shaft carries a weighted knob which, when the container rotates, keeps it steady by a gyroscopic action, making for quiet and vibration-free operation.

The dryer is 26in high by 15in in diameter and is fitted with two large wheels for ease of movement. The weight is 56 lb. The exterior finish is in white high gloss stoved enamel and models are available for 200/220 and 230/250 V, a.c. only. The price is £31 7s 7d plus £13 15s 5d purchase tax in the United Kingdom.

Foot Switch

In order to meet the demand for a smaller and lighter foot switch, H. G. POXON ENGINEERING, LTD., Northolt Road, Harrow, Middlesex, have introduced their new model 554. The casing comprises a pair of substantial aluminium alloy castings and there is no separate pedal as pressure is applied to the cover casting, which



Davidson "Paramount" 3 pt electric kettle

Above: H. G. Poxon model 554 foot switch

Right: Side view of the Philips type 13113C/01 projector lamp

gives the whole a smooth streamlined appearance with minimum obstruction on the floor.

The terminals are readily accessible for wiring by removing two screws, and a rubber sleeve and cable grip suitable for c.t.s. flexible are provided as standard, but ¾in screwed conduit entry is available as an alternative. The contacts are suitable for use on voltages up to 250 a.c. only, and the maximum current rating is 5 A.

The switch contact mechanism may be varied to suit individual requirements, but generally consists of a micro break type switch suitable for frequent operation and giving long life. Rubber feet are provided, but provision is also made for screwing to the floor if necessary, and the finish is hard silver grey enamel. The list price is 42s 6d.

Combustion Additive

A new combustion additive in powder form is being tested by the Southern Division of the Central Electricity Authority on the boilers of the new oil-fired power station at Marchwood. The additive has been developed and is being marketed by the Amber Chemical Co., Ltd. The powder is used in the Amber SSR 113 process which has been selected for trials by the C.E.A. together with various other combustion additives.

The evidence collected to date by the C.E.A. at Marchwood shows that Amber SSR 113 can substantially reduce fireside corrosion and improve boiler availability.

The additive is in the form of a fine grey powder composed of alkaline earth and certain other metals. In use it is injected direct into the combustion zone through the Amber patented injection system using compressed air, and is claimed to be the only process of its kind in this country. The only capital cost involved in adopting the process is that of the injectors and hoppers and their installation. The treatment costs an average of 1s 3d to 1s 9d per ton of fuel burned.

It is the Authority's intention to make further tests of the process upon two or three other boilers at Marchwood during the coming winter. Additionally the process is being tested upon the first boiler at the Poole generating station to be converted to fuel oil firing, this decision being based upon the results obtained so far at Marchwood.

PARLIAMENTARY REPORT

In the House of Commons last week Mr. Malcolm MacPherson asked the Prime Minister whether he would arrange for one Government Department to be responsible for maintaining records of the numbers, qualifications, and types of appointment held by engineers and technologists of professional standard.

Mr. Macmillan replied that the Minister of Labour was already responsible for collecting information about the employment of persons in Great Britain, including engineers and technologists. Records as full as those suggested could be kept only with a degree of expense which would appear disproportionate to their value.

Mr. MacPherson said that recently there had been statements, by scientists well placed to know, that the number of scientists and technologists needed to achieve the modest target that the Government had set would not be obtained. For this reason it was desirable that records should be kept to show where we were using the scientists and technologists that we had.

Mr. Macmillan said he would look into this point, but he did not think it would be the general view that the Government should revert to the wartime practice of having compulsory registration of all scientists, engineers and so forth by the Ministry of Labour.

National Service Deferment

Mr. Iain Macleod, Minister of Labour, replying to Dr. King, said that the Willis Jackson Committee had recommended that science and engineering graduates with second-class honours degrees should be granted indefinite deferment on the same conditions as first-class honours men—that was on condition that they took employment for which a science or engineering degree was required. He had received a similar proposal from the Federation of British Industries and had referred both recommendations to the Technical Personnel Committee for their advice. They were to consider the matter in the course of the next few weeks.

Dr. King said that there was a shortage of science teachers in technical institutions and the release of these second-class honours men would be an important contribution to the expansion of technical education.

The Minister said that he appreciated this.

Purchase Tax Anomalies

Mr. Gerald Nabarro asked the first of his long series of questions about purchase tax anomalies which he has put down to the Chancellor of the Exchequer. He will ask three every week up to Budget time next year.

Mr. Thorneycroft said he was examining alleged anomalies in the rates of purchase tax. In that review he would take account of Mr. Nabarro's researches.

Dr. King asked the Chancellor if, as on a previous occasion, he would announce proposed changes in purchase tax in January rather than in April.

Mr. Thorneycroft said it would be wrong for him to indicate when he might contemplate any action in regard to purchase tax.

Re-Rating of Industry

The Local Government Bill, which provides that industry and freight transport shall be re-rated to 50 per cent (now 25 per cent) of the net annual value as from 1st April, 1959, was read the first time in the Commons. It also provides that the electricity industry will be rated on a basis similar to that at present in force for the gas industry, which means that premises used by the industry will be placed on the valuation list in the ordinary way and the electricity authorities will pay rates locally instead of making pooled payments in lieu of rates on a national scale. It is provided that in determining whether any place is wholly or mainly occupied and used by the industry, the receipt of payments for gas and electricity consumed shall be disregarded. It also provides that gas and electricity showrooms shall be separately and directly assessed for rates.

Scottish Clean Air Council

Replying to Sir William Anstruther-Gray, the Secretary of State for Scotland announced the appointment of the Clean Air Council for Scotland as required under the Clean Air Act, 1956. Sir David Anderson, Ph.D., director of the Royal College of Science and Technology, Glasgow, is chairman and the members include Mr. E. Hywel Jones, M.I.E.E., M.I.Mech.E. (South of Scotland Electricity Board).

Wages, Prices and Productivity

Mr. George Darling asked the Chancellor of the Exchequer if he would amend the terms of reference of Lord Cohen's Council on Wages, Prices and Productivity so as to allow the Council to inquire into and report on the extent to which industrial management had not introduced modern machinery and modern methods of operations as recommended in the reports of the Productivity Council.

Mr. Thorneycroft said that the Council's existing terms of reference, which included the review of changes in productivity, would be sufficiently wide for such inquiries, but it was for the Council to decide whether or not it wished to pursue them.

Oil-Fired Power Stations

Mr. Palmer asked to what extent, in view of the increasing production of small coal, the further extension of oil firing in power stations was being abandoned.

Mr. Renton said that two stations under construction would now burn coal instead of oil and the conversion of a third station from coal to oil was being reconsidered. These changes would reduce the estimated consumption of oil by between 1½ and 2 million tons a year, equivalent to about 2½ or 3 million tons of coal.

Mr. Palmer asked whether it would not be wise now to drop the conversion programme altogether.

Mr. Renton replied that a number of legally-binding contracts were entered into by the C.E.A. and the oil companies quite freely on both sides. He did not think they should so sweepingly interfere with the contracts.

Rural Electrification

Mr. Renton, Parliamentary Secretary, Ministry of Power, replying to Mr. Palmer, said that it was not possible to estimate the effect of the rephasing of capital expenditure until Area Boards had worked out their future capital investment programmes in detail. It was probable, however, that rural electrification would continue to develop at a relatively high rate although, even without rephasing, it would have slowed down somewhat owing to the inaccessibility of many of the farms not yet connected.

Pension Schemes

In an adjournment debate, Mr. Robert Edwards called attention to the anomalies of the old and new pensions schemes for the staff employed in the electricity supply industry in the West Midlands.

Mr. Renton, in reply, said that when the industry was nationalised the pensions scheme which was submitted and approved did not apply to those who already had the benefit of the old schemes, whether company schemes or municipality schemes. The C.E.A. had now submitted to the Minister of Power various amendments to the scheme approved in 1955. One of the proposals was that all the present employees of the C.E.A. and the Area Boards who were at present in the old company or municipality schemes, but were excluded from what was called the manual workers' scheme, should be able to join it if they wished to, from an early date. The Minister had approved the proposal in principle although several details had yet to be worked out, and the final drafting had to be approved by all concerned.

DOMESTIC ELECTRICAL EQUIPMENT

Immersion Heaters

THE comparatively low installation cost of an immersion heater, coupled with the fact that existing piping arrangements do not have to be disturbed, undoubtedly contributes largely to the popularity of this method of water heating. Providing the storage tank is efficiently lagged and that the length of pipe runs is kept to the minimum, it is an economical form of water heating. A well-planned installation should provide sufficient hot water for a bath within 90 minutes.

Two types of immersion heater are available: the removable element design, in which the heating element can be withdrawn without first emptying the tank, and the embedded or non-withdrawable pattern. There is little to choose between the two from the point of view of efficiency and both are made for fixing either vertically or horizontally. Circulators, consisting of a perforated metal tube which fits over the entire length of the heater, provide for a speedier supply of small quantities of hot water, but their use is not advised in hard water districts.

The majority of immersion heaters are rated at either 2 or 3 kW and the immersed length ranges between 10 and 36in. Thermostats, which are sold free of purchase tax, are available as extras and in most cases pockets are provided for them in the heaters. In districts where the water is reasonably soft, the temperature setting of the thermostat may be in the region of 160 deg F, but in hard water districts, in order to reduce the formation of scale, 140 deg F is the recognised temperature.

Manufacturer	Name or model	Type	Immersed length (inches)	Loading	Thermostat pocket	Size of B.S.P.T. head (inches)	Price (excl. tax)	Purchase tax
AIDAS ELECTRIC CO., LTD., Rowdell Road, Northolt, Greenford, Middlesex.	"Dumpy"	Non-withdrawable	10½ to 20	2 kW	Yes	2½	£2 5 0	£0 19 10
	"Dumpy"	Non-withdrawable	24 and 27	2 kW	Yes	2½	£2 7 6	£1 0 11
	"Dumpy"	Non-withdrawable	15 to 30	3 kW	Yes	2½	£2 7 6	£1 0 11
	"Grid"	Non-withdrawable	7¾	2 kW	Yes	1½	£2 12 6	£1 3 2
	"Grid"	Non-withdrawable	7¾	2 kW	No	1½	£2 7 6	£1 0 11
	"U2"	Non-withdrawable	10½ to 20	2 kW	No	1½	£1 18 0	£0 16 9
	"U3"	Non-withdrawable	14¾ to 30	3 kW	No	1½	£2 4 0	£0 19 5
	"UT2"	Non-withdrawable	10½ to 20	2 kW	Yes	1½	£2 5 0	£0 19 10
	"UT3"	Non-withdrawable	14¾ to 30	3 kW	Yes	1½	£2 7 6	£1 0 11
	"Spirod"	Non-withdrawable	18 to 24	2 kW	Yes	2½	£3 5 0	£1 8 8
	"Spirod"	Non-withdrawable	10⅜	3 kW	Yes	2½	£2 7 6	£1 0 11
	"Spirod"	Non-withdrawable	21 to 36	3 kW	Yes	2½	£3 10 0	£1 10 10
	"ATC2"	Withdrawable	21 to 30	2 kW	Yes	2½	£5 7 0 to £6 3 6	£2 7 1 to £2 14 5
	"ATC3"	Withdrawable	21 to 36	3 kW	Yes	2½	£5 12 6 to £7 0 0	£2 9 6 to £3 1 8
	"ATC4"	Withdrawable	27 to 36	4 kW	Yes	2½	£6 11 0 to £7 7 6	£2 17 8 to £3 4 11
	"IH"	Withdrawable	10 to 20	250 to 500 W	No	¾	£1 8 3 to £1 13 9	£0 12 6 to £0 14 11
	"PTL"	Withdrawable	10½ to 16½	1 to 2 kW	No	1½	£1 16 0 to £2 0 0	£0 15 11 to £0 17 8
BENHAM & SONS, LTD., 66, Wigmore Street, London, W.1.	5023	Non-withdrawable	5	1 kW	No	2	£4 5 0	£1 17 5
	5024	Non-withdrawable	7	1½ kW	No	2	£4 9 0	£1 19 2
	5025	Non-withdrawable	8½	2 kW	No	2	£4 12 0	£2 0 6
	5026	Non-withdrawable	11	2½ kW	No	2	£4 17 6	£2 2 11
	5027	Non-withdrawable	12½	3 kW	No	2	£5 0 0	£2 4 0

Manufacturer	Name or model	Type	Immersed length (inches)	Loading	Thermostat pocket	Size of B.S.P.T. head (inches)	Price (excl. tax)	Purchase tax
BENHAM & SONS, LTD., 66, Wigmore Street, London, W.1. *(continued)*	5028	Non-withdrawable	14	3½ kW	No	2	£5 3 6	£2 5 6
	5029	Non-withdrawable	16	4 kW	No	2	£5 11 6	£2 9 1
	7113	Non-withdrawable	10½	2 kW	Yes	2	£6 0 0	£2 12 10
	7114	Non-withdrawable	10½	2½ kW	Yes	2	£6 3 0	£2 14 2
	7115	Non-withdrawable	10½	2½ kW	Yes	2	£6 6 0	£2 15 5
	7116	Non-withdrawable	12	2¾ kW	Yes	2	£6 7 0	£2 15 10
	7117	Non-withdrawable	12	3 kW	Yes	2	£6 8 0	£2 16 4
	7118	Non-withdrawable	13¾	3¼ kW	Yes	2	£6 10 0	£2 17 2
	7119	Non-withdrawable	13¾	3½ kW	Yes	2	£6 11 6	£2 17 10
	7120	Non-withdrawable	15¾	3¾ kW	Yes	2	£6 15 0	£2 19 5
	7121	Non-withdrawable	15¾	4 kW	Yes	2	£6 18 6	£3 0 11
BERRY'S ELECTRIC, LTD. Touchbutton House, Newman Street, London, W.1.	"Bluehead"	Single loop embedded	11½ to 36	3 kW	Yes	2½	£2 10 0	£1 2 0
C. H. BLACKBURN & CO., LTD., 10, Grays Inn Road, London, W.C.1.	"Stellex" W212H	Non-withdrawable	12	2 kW	Yes	2½	£3 8 6	£1 10 2
	"Stellex" W221HV	Non-withdrawable	21	2 kW	Yes	2½	£4 1 6	£1 15 11
	"Stellex" W312H	Non-withdrawable	12	3 kW	Yes	2½	£3 15 0	£1 13 0
	"Stellex" W321HV	Non-withdrawable	21	3 kW	Yes	2½	£4 9 0	£1 19 2
GEO. BRAY & CO., LTD., Leicester Place, Blackman Lane, Leeds, 2.	"Tubalox" LAMS	Double element, non-withdrawable	11⅜	2 kW	Yes	2½	£4 14 0	£2 1 4
	"Tubalox" LAMS	Double element, non-withdrawable	13⅜ to 18	2 or 3 kW	Yes	2½	£5 4 6	£2 6 0
	"Tubalox" LAMS	Double element, non-withdrawable	21 to 42	2 or 3 kW	Yes	2½	£5 4 6	£2 6 0
	"Tubalox" LAQD	Single element, non-withdrawable	11½	2 kW	Yes	2½	£2 10 0	£1 2 0

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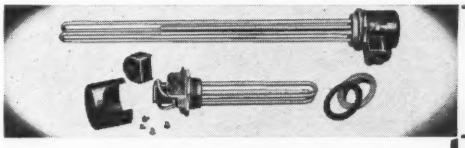

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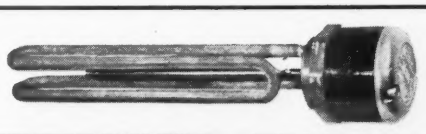
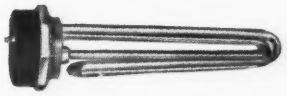
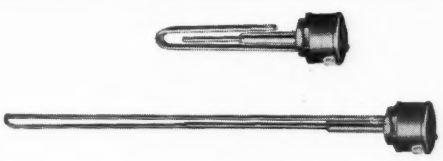


1. *Geo. Bray "Tubalox" type LAMS*
2. *Blackburn W312H "Stellex" heater*
3. *Aidas 2 kW "Dumpy"*
4. *Two heaters from the Berry's "Bluehead" range*
5. *Benham non-withdrawable type with combined thermostat*

3





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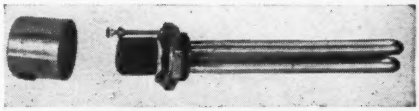
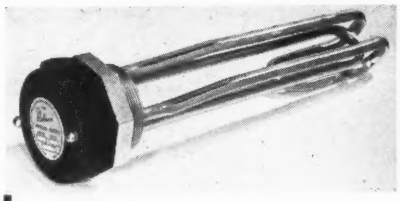


Manufacturer	Name or model	Type	Immersed length (inches)	Loading	Thermostat pocket	Size of B.S.P.T. head (inches)	Price (excl. tax)	Purchase tax
GEO. BRAY & CO., LTD., Leicester Place, Blackman Lane, Leeds, 2. *(continued)*	"Tubalox" LAQD	Single element, non-withdrawable	13½ to 18	2 or 3 kW	Yes	2½	£2 10 0	£1 2 0
	"Tubalox" LAQD	Single element, non-withdrawable	21 to 30	2 or 3 kW	Yes	2½	£2 10 0	£1 2 0
BRITISH NATIONAL ELECTRICS, LTD., Newarthill, Motherwell, Scotland.	B.N.E.	Non-withdrawable	11 to 36	3 kW	Yes	2⅞	£2 10 0	£1 2 0
	B.N.E.	Withdrawable	24	2 kW	Yes	2⅞	£4 17 0	£2 2 7
	B.N.E.	Withdrawable	26	2 kW	Yes	2⅞	£5 2 0	£2 4 9
	B.N.E.	Withdrawable	28	2 kW	Yes	2⅞	£5 6 0	£2 6 6
	B.N.E.	Withdrawable	30	2 kW	Yes	2⅞	£5 10 0	£2 8 3
	B.N.E.	Withdrawable	30	3 kW	Yes	2⅞	£5 15 0	£2 10 6
	B.N.E. Dual Service	Withdrawable	24	2 or 3 kW	Yes	2⅞	£3 10 0	£1 10 9
	B.N.E. Dual Service	Withdrawable	28	2 or 3 kW	Yes	2⅞	£3 10 0	£1 10 9
	B.N.E. 19 Outfit	Non-withdrawable, side entry circulator	13	2 kW	Yes	2⅞	£5 10 0	£1 15 1
	B.N.E. 20 Outfit	Non-withdrawable, side entry circulator	17	3 kW	Yes	2⅞	£6 5 0	£2 1 8
BULPITT & SONS, LTD., St. George's Works, Icknield Street, Birmingham, 18.	311HV and 314HV	Non-withdrawable shallow head	11 and 14	3 kW	Yes	2½	£2 10 0	£1 2 0
	318HV and 321HV	Non-withdrawable shallow head	18 and 21	3 kW	Yes	2½	£2 10 0	£1 2 0
	324HV and 327V	Non-withdrawable, shallow head	24 and 27	3 kW	Yes	2½	£2 10 0	£1 2 0
	330V and 336V	Non-withdrawable shallow head	30 and 36	3 kW	Yes	2½	£2 10 0	£1 2 0
CONTROLLED HEATING UNITS (LONDON), LTD., Avenue Road, Hampton, Middlesex.	"Rubicon" PN	Non-withdrawable	12 and 16	2 kW	No	2½	£2 11 3	£1 2 6
	"Rubicon" PN	Non-withdrawable	21 to 30	2 kW	No	2½	£2 16 5	£1 4 9
	"Rubicon" PN	Non-withdrawable	36	2 kW	No	2½	£3 1 6	£1 7 0
	"Rubicon" PN	Non-withdrawable	16	3 kW	No	2½	£2 11 3	£1 2 6
	"Rubicon" PN	Non-withdrawable	21 to 30	3 kW	No	2½	£2 16 5	£1 4 9
	"Rubicon" PN	Non-withdrawable	36	3 kW	No	2½	£3 1 6	£1 7 0
	"Rubicon" MBX	Non-withdrawable	12 and 16	2 kW	Yes	2½	£2 16 5	£1 4 9
	"Rubicon" MBX	Non-withdrawable	21 to 30	2 kW	Yes	2½	£3 1 6	£1 7 0
	"Rubicon" MBX	Non-withdrawable	36	2 kW	Yes	2½	£3 6 8	£1 9 3
	"Rubicon" MBX	Non-withdrawable	12 and 16	3 kW	Yes	2½	£2 16 5	£1 4 9
	"Rubicon" MBX	Non-withdrawable	21 to 30	3 kW	Yes	2½	£3 1 6	£1 7 0
	"Rubicon" MBX	Non-withdrawable	36	3 kW	Yes	2½	£3 6 8	£1 9 3
	"Rubicon" NA	Non-withdrawable	12 and 16	2 kW	No	1½	£2 16 5	£1 4 9
	"Rubicon" NA	Non-withdrawable	21 to 30	2 kW	No	1½	£3 1 6	£1 7 0
	"Rubicon" NA	Non-withdrawable	36	2 kW	No	1½	£3 6 8	£1 9 3
	"Rubicon" NA	Non-withdrawable	12 and 16	3 kW	No	1½	£2 16 5	£1 4 9
	"Rubicon" NA	Non-withdrawable	21 to 30	3 kW	No	1½	£3 1 6	£1 7 0
	"Rubicon" NA	Non-withdrawable	36	3 kW	No	1½	£3 6 8	£1 9 3

Manufacturer	Name or model	Type	Immersed length (inches)	Loading	Thermostat pocket	Size of B.S.P.T. head (inches)	Price (excl. tax)	Purchase tax
CREDA (SIMPLEX ELECTRIC CO., LTD.), Creda Works, Blythe Bridge, Staffs.	"Creda Redhead" 138/11DD and 138/14DD	Embedded	11½ and 14	3 kW	Yes	2½	£2 10 0	£1 2 0
	"Creda Redhead" 138/18DD	Embedded	18	3 kW	Yes	2½	£2 10 0	£1 2 0
	"Creda Redhead" 138/23DD and 138/27DD	Embedded	23 and 27	3 kW	Yes	2½	£2 10 0	£1 2 0
	"Creda Redhead" 138/30DD and 138/36DD	Embedded	30 and 36	3 kW	Yes	2½	£2 10 0	£1 2 0
	137/95	Embedded	14	3 kW	No	1½	£2 6 4	£1 0 5
	137/96 and 137/97	Embedded	10 and 16	2 kW	No	1½	£2 6 4	£1 0 5
ELTRON (LONDON), LTD., Accrington Works, Strathmore Road, Croydon, Surrey.	D.201	Non-withdrawable	14, 17 and 20	2 kW	Yes	1½	£2 12 6	£1 3 7
	D.202	Non-withdrawable	14, 17 and 20	2 kW	Yes	2½	£2 17 6	£1 5 10
	D.301	Non-withdrawable	18, 24 and 30	3 kW	Yes	1½	£3 10 6	£1 11 9
	D.302	Non-withdrawable	18, 24 and 30	3 kW	Yes	2½	£3 15 6	£1 14 0
FALK, STADELMANN & CO., LTD., 91, Farringdon Road, London, E.C.1.	U.95754	Non-withdrawable	11	2 kW	Yes	2½	£2 10 0	£1 2 0
	U.95754	Non-withdrawable	11, 18, 23 and 27	3 kW	Yes	2½	£2 10 0	£1 2 0
	U.95755	Non-withdrawable	11	2 kW	Yes	2½	£2 10 0	£1 2 0
	U.95755	Non-withdrawable	11, 18, 23 and 27	3 kW	Yes	2½	£2 10 0	£1 2 0



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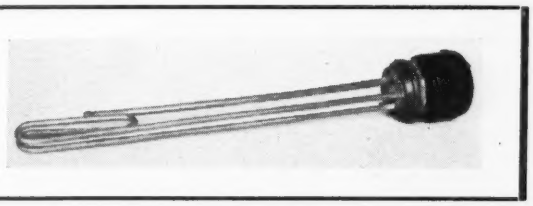

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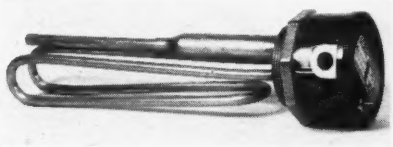

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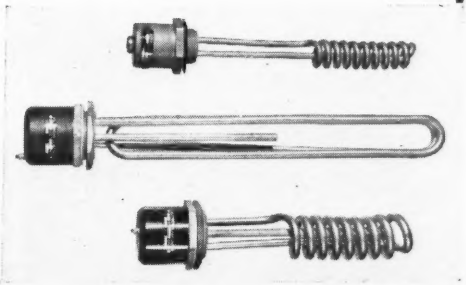

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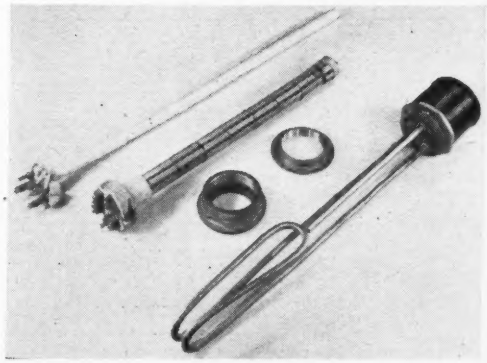

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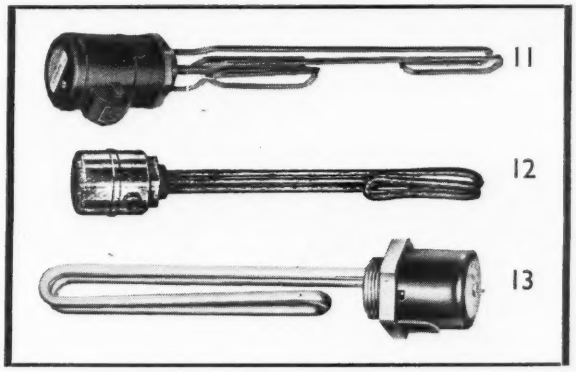
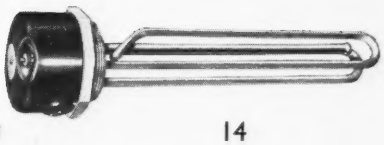
6. *Controlled Heating Units type PN "Rubicon"*
7. *A typical B.N.E. immersion heater*
8. *Creda DD "Redhead" immersion heater (Simplex Electric Co., Ltd.)*
9. *Range of Eltron domestic heaters*
10. *Sectional view of the G.B.M. type A model alongside a type B heater*

Manufacturer	Name or model	Type	Immersed length (inches)	Loading	Thermostat pocket	Size of B.S.P.T. head (inches)	Price (excl. tax)	Purchase tax
G.B.M. (ELECTRICAL) BIRMINGHAM, LTD., 439, Moseley Road, Birmingham, 12.	D	Non-withdrawable	10 to 27	2 kW	Yes	1½	£2 10 0	£1 2 0
	B	Non-withdrawable	11 to 29	3 kW	Yes	2½	£2 10 0	£1 2 0
	A	Withdrawable	10 to 42	2 kW	Yes	2½	£4 7 6 to £5 17 6	£1 18 5 to £2 11 7
	A	Withdrawable	10 to 42	3 kW	Yes	2½	£5 0 0 to £7 5 0	£2 3 9 to £3 3 6
	A	Withdrawable	12 to 42	4 kW	Yes	2½	£6 0 0 to £8 14 0	£2 12 6 to £3 16 2
GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2.	DE2000H	Sheathed wire	10½	2 kW	No	1½	£2 6 3	£1 0 4
	DE2111 DE2118 DE2123 DE2127 DE2130	Sheathed wire	11 to 30	2 kW	Yes	2½	£2 10 0	£1 2 0
	DE3000H	Sheathed wire	14½	3 kW	No	1½	£2 6 3	£1 0 4
	DE3111 DE3118 DE3123 DE3127 DE3130	Sheathed wire	11 to 30	3 kW	Yes	2½	£2 10 0	£1 2 0
	DE2123A DE2127A DE2130A	Dual-service Sheathed wire	23 to 30	1 and 2 kW	Yes	2½	£4 0 0	£1 15 1
GRUBB ENGINEERING CO., LTD., Mary Street, Birmingham, 12.	"Grubb"	Withdrawable	11 to 42	3 kW	Yes	2½	£4 15 0 to £8 5 0	£2 1 8 to £3 12 5
	"Grubb"	Withdrawable	11 to 42	2 kW	Yes	2½	£4 10 0 to £7 10 0	£1 19 6 to £3 5 9
	"Grubb"	Withdrawable	16 to 42	4 kW	Yes	2½	£6 5 0 to £8 16 0	£2 14 10 to £3 17 3
	"Grubb"	Embedded	11 to 30	2 or 3 kW	Yes	2½	£2 9 4	£1 1 8
HEATRAE, LTD., Heatrae Works, Norwich.	"Slimrod"	Embedded	11	2 kW	Yes	2½	£2 9 8	£1 1 10
	"Slimrod"	Embedded	12	3 kW	Yes	2½	£2 9 8	£1 1 10
	"Slimrod"	Embedded	21 to 30	3 kW	Yes	2½	£2 9 8	£1 1 10
	—	Embedded	16	2 kW	No	1½	£4 14 0	£2 1 3
	—	Embedded	11	2 kW	No	2	£5 2 0	£2 4 9
	—	Embedded	16	3 kW	No	1½	£5 14 6	£2 10 3
	—	Embedded	12	3 kW	No	2	£5 18 0	£2 11 10
	—	Embedded	10	4 kW	No	2	£8 7 0	£3 13 4
	—	Embedded	16	4 kW	No	2	£8 17 6	£3 17 11
	—	Withdrawable	21, 24 and 27	2 kW	Yes	2½	£5 12 6 (21) £6 0 6 (24) £6 8 6 (27)	£2 9 5 (21) £2 12 11 (24) £2 16 5 (27)
	—	Withdrawable	30 or 36	2 or 3 kW	Yes	2½	£6 15 6 (30) £7 10 6 (36)	£2 19 6 (30) £3 6 1 (36)
	—	Withdrawable	42	3 or 4 kW	Yes	2½	£8 5 0	£3 12 5
HOTPOINT ELECTRIC APPLIANCE CO., LTD., Crown House, Aldwych, London, W.C.2.	A	A2010 (double blade)	10	2 kW	No	1½	£2 10 0	£1 2 0
	A	AA2010 (single blade)	10	2 kW	No	1½	£2 7 6	£1 0 11
	B	BB3010	10	3 kW	No	2	£2 17 6	£1 5 3
	A	A3014 (double blade)	14	3 kW	No	1½	£2 12 6	£1 3 1
	A	AA3014 (single blade)	14	3 kW	No	1½	£2 10 0	£1 2 0
	B	B4018	18	4 kW	No	2	£3 15 0	£1 13 0
	B	B5018	18	5 kW	No	2	£4 15 0	£2 1 9
	CD	CD1010	10	1 kW	Yes	2½	£2 7 6	£1 0 11
	CD	CD2010	10	2 kW	Yes	2½	£2 9 8	£1 1 10
	CD	CD2027*	27	2 kW	Yes	2½	£2 10 0	£1 2 0



11. *Hotpoint "Twimerser" dual-purpose model*
12. *Grubb embedded type heater*
13. *G.E.C. DE2000H 10½in heater*
14. *Heatrae "Slim-rod" heater*
15. *Hotpoint type CD heater*



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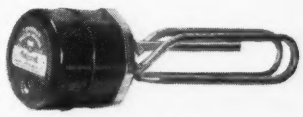

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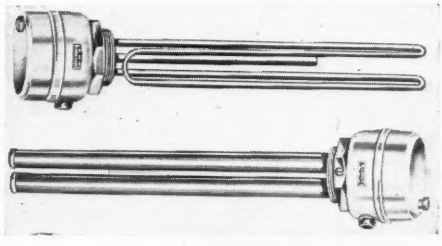
Manufacturer	Name or model	Type	Immersed length (inches)	Loading	Thermostat pocket	Size of B.S.P.T. head (inches)	Price (excl. tax)	Purchase tax
HOTPOINT ELECTRIC APPLIANCE CO., LTD., Crown House, Aldwych, London, W.C.2. *(continued)*	CD	CD2510	10	2½ kW	Yes	2½	£2 10 0	£1 2 0
	CD	CD2527*	27	2½ kW	Yes	2½	£2 10 0	£1 2 0
	CD	CD3010	10	3 kW	Yes	2½	£2 10 0	£1 2 0
	CD	CD3027*	27	3 kW	Yes	2½	£2 10 0	£1 2 0
	CD	CD3030	30	3 kW	Yes	2½	£2 10 0	£1 2 0
	CD	CD3036	36	3 kW	Yes	2½	£2 10 0	£1 2 0
	CF	CF1010	10	1 kW	Yes	2½	£2 7 6	£1 0 11
	CF	CF2010	10	2 kW	Yes	2½	£2 9 8	£1 1 10
	CF	CF2027*	27	2 kW	Yes	2½	£2 10 0	£1 2 0
	CF	CF2510	10	2½ kW	Yes	2½	£2 10 0	£1 2 0
	CF	CF2527*	27	2½ kW	Yes	2½	£2 10 0	£1 2 0
	CF	CF3010	10	3 kW	Yes	2½	£2 10 0	£1 2 0
	CF	CF3027*	27	3 kW	Yes	2½	£2 10 0	£1 2 0
	CF	CF3030	30	3 kW	Yes	2½	£2 10 0	£1 2 0
	CF	CF3036	36	3 kW	Yes	2½	£2 10 0	£1 2 0
	CJ	CJ1010	10	1 kW	Yes	2½	£2 7 6	£1 0 11
	CJ	CJ2010	10	2 kW	Yes	2½	£2 7 6	£1 0 11
	CJ	CJ2027*	27	2 kW	Yes	2½	£2 7 6	£1 0 11
	CJ	CJ2510	10	2½ kW	Yes	2½	£2 7 6	£1 0 11
	CJ	CJ2527*	27	2½ kW	Yes	2½	£2 7 6	£1 0 11
	CJ	CJ3010	10	3 kW	Yes	2½	£2 7 6	£1 0 11
	CJ	CJ3027*	27	3 kW	Yes	2½	£2 7 6	£1 0 11
	CJ	CJ3030	30	3 kW	Yes	2½	£2 7 6	£1 0 11
	CJ	CJ3036	36	3 kW	Yes	2½	£2 7 6	£1 0 11
	CK	CK1010	10	1 kW	Yes	2½	£2 7 6	£1 0 11
	CK	CK2010	10	2 kW	Yes	2½	£2 7 6	£1 0 11
	CK	CK2027*	27	2 kW	Yes	2½	£2 7 6	£1 0 11
	CK	CK2510	10	2½ kW	Yes	2½	£2 7 6	£1 0 11
	CK	CK2527*	27	2½ kW	Yes	2½	£2 7 6	£1 0 11
	CK	CK3010	10	3 kW	Yes	2½	£2 7 6	£1 0 11
	CK	CK3027*	27	3 kW	Yes	2½	£2 7 6	£1 0 11
	CK	CK3030	30	3 kW	Yes	2½	£2 7 6	£1 0 11
	CK	CK3036	36	3 kW	Yes	2½	£2 7 6	£1 0 11
	"Twimerser"†	CH10/3036	10 and 36	1 and 3 kW	—	2½	£5 5 0	£2 6 1
	"Twimerser"	CH15/2527	8 and 27	1½ and 2½ kW	—	2½	£5 5 0	£2 6 1
	"Twimerser"	CH20/3027 Dual purpose	10 and 27	2 and 3 kW	—	2½	£5 5 0	£2 6 1
	"Twimerser"†	CH20/3036 Dual purpose	10 and 36	2 and 3 kW	—	2½	£5 5 0	£2 6 1
	"Twimerser"‡	CHB20/3036	10 and 36	2 and 3 kW	—	2½	£5 5 0	£2 6 1

* These heaters may be formed on site to intermediate lengths between 18 and 27in.
† Heaters may be bent back to intermediate lengths between 24 and 36in.
‡ Suitable for cylinders less than 15in diameter.

Manufacturer	Name or model	Type	Immersed length (inches)	Loading	Thermostat pocket	Size of B.S.P.T. head (inches)	Price (excl. tax)	Purchase tax
DUNCAN LOW, LTD., 57-61, Trossachs Street, Glasgow, N.W.	8720	Vertical	11 to 16	2 kW	Yes	2½	£2 10 0	£1 2 0
	8730	Vertical	16 to 30	3 kW	Yes	2½	£2 10 0	£1 2 0
	8620	Circulator, side fixing	9½	2 kW	Yes	Oval flange	£2 17 0	£1 5 0
	8630	Circulator, side fixing	17	2 kW	Yes	Oval flange	£3 3 0	£1 7 9
METWAY ELECTRICAL INDUSTRIES, LTD., Canning Street, Kemp Town, Brighton, 7.	EWH113	Embedded	11	3 kW	Yes	2½	£2 19 6	£1 5 9
	EWH143	Embedded	14	3 kW	Yes	2½	£3 1 0	£1 6 5
	EWH183	Embedded	18	3 kW	Yes	2½	£3 2 0	£1 6 10
	EWH243	Embedded	24	3 kW	Yes	2½	£3 3 0	£1 7 3
	EWH273	Embedded	27	3 kW	Yes	2½	£3 4 0	£1 7 9
	EWH303	Embedded	30	3 kW	Yes	2½	£3 5 0	£1 8 2
MITCHELL ELECTRIC, LTD., 88-90, Tennant Street, Birmingham, 15	IG/14	Embedded	14	3 kW	Yes	2½	£2 9 2	£1 2 2
	IG/18	Embedded	18	3 kW	Yes	2½	£2 11 9	£1 3 4
	IG/24, IG/27 and IG/30	Embedded	24, 27 and 30	3 kW	Yes	2½	£2 14 2	£1 4 5
	IR/14	Withdrawable	14	3 kW	Yes	2½	£5 3 10	£2 6 9
	IR/18	Withdrawable	18	3 kW	Yes	2½	£5 7 6	£2 8 5
	IR/24	Withdrawable	24	3 kW	Yes	2½	£6 0 6	£2 14 2
	IR/27	Withdrawable	27	3 kW	Yes	2½	£6 9 2	£2 18 1
	IR/30	Withdrawable	30	3 kW	Yes	2½	£6 13 6	£3 0 0
T. B. MORLEY & CO., LTD., Jameson Street, Hull.	"Te Beam" S12	Embedded	12	2½ kW	Yes	2½	£2 3 0	£0 18 11
NEW DAY ELECTRIC, LTD., Cotswold Works, Chalford, Nr. Stroud, Glos.	"Duo Coil"	N.H.10	10	2 kW	No	1½	£2 5 8	£1 0 0
	"Duo Coil"	H.14	14	2·5 kW	Yes	1½	£2 6 6	£1 0 5
	"Duo Coil"	V.18	18	3 kW	Yes	1½	£2 7 6	£1 0 10
	"Duo Coil"	V.24	24	3 kW	Yes	1½	£2 7 6	£1 0 10
	"Duo Coil"	V.27	27	3 kW	Yes	1½	£2 7 6	£1 0 10
	"Duo Coil"	V.30	30	3 kW	Yes	1½	£2 10 0	£1 2 0
	"Duo Coil"	V.36	36	3 kW	Yes	1½	£2 12 6	£1 3 0
	"Duo Coil"	H.12A	11½	3 kW	Yes	2½	£2 7 6	£1 0 10
	"Duo Coil"	V.18A	18	3 kW	Yes	2½	£2 10 0	£1 2 0
	"Duo Coil"	V.24A	24	3 kW	Yes	2½	£2 10 0	£1 2 0
	"Duo Coil"	V.27A	27	3 kW	Yes	2½	£2 10 0	£1 2 0
	"Duo Coil"	V.30A	30	3 kW	Yes	2½	£2 10 0	£1 2 0
	"Duo Coil"	V.36A	36	3 kW	Yes	2½	£2 15 0	£1 4 2
	"Duo Coil"	T.V.24	24	4 kW	Yes	2½	£4 15 0	£2 1 8
	"Duo Coil"	T.V.27	27	4 kW	Yes	2½	£4 15 0	£2 1 8
	"Duo Coil"	T.V.30	30	4 kW	Yes	2½	£4 15 0	£2 1 8
	"Duo Coil"	T.V.36	36	4 kW	Yes	2½	£4 15 0	£2 1 8
REMPLOY, LTD., 25-28, Buckingham Gate, London, S.W.1.	MH7/1	Non-withdrawable, Sheathed	12	2½ kW	Yes	2½	£2 9 0	£1 1 6
	MH7/2	Non-withdrawable, Sheathed	14	3 kW	Yes	2½	£2 10 0	£1 1 11
	MH7/3	Non-withdrawable, Sheathed	27	3 kW	Yes	2½	£2 10 0	£1 1 11
	MH7/4	Non-withdrawable, Sheathed	30	3 kW	Yes	2½	£2 10 0	£1 1 11
	MH7/5	Non-withdrawable, Sheathed	36	3 kW	Yes	2½	£2 10 0	£1 1 11
SANTON, LTD., Somerton Works, Newport, Mon.	IR/112	"R"	12	1 kW	Yes	2½	£4 7 6	£1 18 6
	IR/212	"R"	12	2 kW	Yes	2½	£4 17 6	£2 2 11
	IR/218	"R"	18	2 kW	Yes	2½	£5 11 6	£2 9 1

Manufacturer	Name or model	Type	Immersed length (inches)	Loading	Thermostat pocket	Size of B.S.P.T. head (inches)	Price (excl. tax)	Purchase tax
SANTON, LTD., Somerton Works, Newport, Mon. (continued)	IR/221	" R "	21	2 kW	Yes	2½	£5 18 6	£2 12 2
	IR/227	" R "	27	2 kW	Yes	2½	£6 12 6	£2 18 4
	IR/230	" R "	30	2 kW	Yes	2½	£6 19 6	£3 1 5
	IR/312	" R "	12	3 kW	Yes	2½	£5 8 6	£2 7 9
	IR/318	" R "	18	3 kW	Yes	2½	£6 2 6	£2 13 11
	IR/321	" R "	21	3 kW	Yes	2½	£6 9 6	£2 17 0
	IR/324	" R "	24	3 kW	Yes	2½	£6 16 6	£3 0 1
	IR/327	" R "	27	3 kW	Yes	2½	£7 3 6	£3 3 2
	IR/330	" R "	30	3 kW	Yes	2½	£7 10 6	£3 6 3
	IR/336	" R "	36	3 kW	Yes	2½	£8 4 6	£3 12 5
	IR/342	" R "	42	3 kW	Yes	2½	£8 18 6	£3 18 6
	IR/418	" R "	18	4 kW	Yes	2½	£7 4 6	£3 3 7
	IR/424	" R "	24	4 kW	Yes	2½	£7 18 6	£3 9 9
	IR/427	" R "	27	4 kW	Yes	2½	£8 5 6	£3 12 10
	IR/442	" R "	42	4 kW	Yes	2½	£10 0 6	£4 8 3
	EQ211	" Beaver "	11	2 kW	Yes	2½	£2 10 0	£1 2 0
	EQ218	" Beaver "	18	2 kW	Yes	2½	£2 10 0	£1 2 0
	EQ223	" Beaver "	23	2 kW	Yes	2½	£2 10 0	£1 2 0
	EQ227	" Beaver "	27	2 kW	Yes	2½	£2 10 0	£1 2 0
	EQ230	" Beaver "	30	2 kW	Yes	2½	£2 10 0	£1 2 0
	EQ311	" Beaver "	11	3 kW	Yes	2½	£2 10 0	£1 2 0
	EQ318	" Beaver "	18	3 kW	Yes	2½	£2 10 0	£1 2 0
	EQ323	" Beaver "	23	3 kW	Yes	2½	£2 10 0	£1 2 0
	EQ327	" Beaver "	27	3 kW	Yes	2½	£2 10 0	£1 2 0
	EQ330	" Beaver "	30	3 kW	Yes	2½	£2 10 0	£1 2 0
	EQ336	" Beaver "	36	3 kW	Yes	2½	£2 12 6	£1 3 1
	EQ416	" Beaver "	16	4 kW	Yes	2½	£3 2 6	£1 7 6



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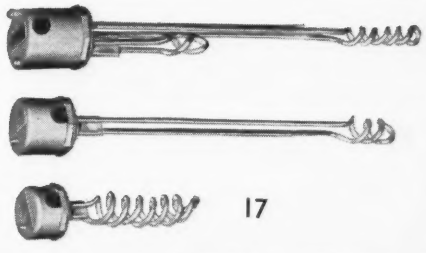

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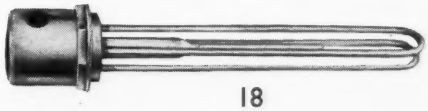

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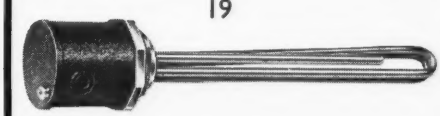

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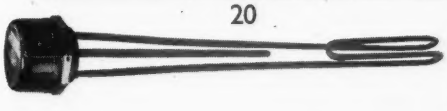

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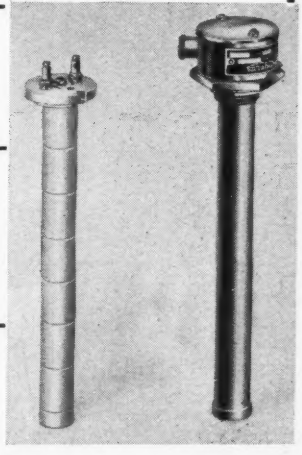

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16. *Mitchell withdrawable and embedded type heaters*
17. *New Day " Duo-Coil " range*
18. *Remploy non-withdrawable type heater*
19. *One of the Duncan Low range*
20. *Santon " Beaver " type heater*
21. *Sperryn withdrawable type heater and element*

Manufacturer	Name or model	Type	Immersed length (inches)	Loading	Thermostat pocket	Size of B.S.P.T. head (inches)	Price (excl. tax)	Purchase tax
SANTON, LTD., Somerton Works, Newport, Mon. (*continued*)	EQ421	"Beaver"	21	4 kW	Yes	2½	£3 2 6	£1 7 6
	EQ436	"Beaver"	36	4 kW	Yes	2½	£3 4 9	£1 8 6
	IQ/3011H	"Otter"	11	3 kW	Yes	2½	£2 10 0	£1 2 0
	IQ/3018HV	"Otter"	18	3 kW	Yes	2½	£2 10 0	£1 2 0
	IQ/3023V	"Otter"	23	3 kW	Yes	2½	£2 10 0	£1 2 0
	IQ/3027V	"Otter"	27	3 kW	Yes	2½	£2 10 0	£1 2 0
	IQ/3030V	"Otter"	30	3 kW	Yes	2½	£2 10 0	£1 2 0
	IQ/3036V	"Otter"	36	3 kW	Yes	2½	£2 12 6	£1 3 1
	IQ/4016	"Otter"	16	4 kW	Yes	2½	£3 2 6	£1 6
	IQ/4036	"Otter"	36	4 kW	Yes	2½	£3 4 9	£1 8 6
	DUO-IQ 1×323	Dual	10 and 23	1 kW and 3 kW	Yes	2½	£5 5 0	£2 6 3
	DUO-IQ 1×327	Dual	10 and 27	1 kW and 3 kW	Yes	2½	£5 5 0	£2 6 3
	DUO-IQ 1×330	Dual	10 and 30	1 kW and 3 kW	Yes	2½	£5 5 0	£2 6 3
	DUO-IQ 1×336	Dual	10 and 36	1 kW and 3 kW	Yes	2½	£5 15 0	£2 10 7
	DUO-IQ 1×342	Dual	10 and 42	1 kW and 3 kW	Yes	2½	£5 15 0	£2 10 7
	WIQ/210	"Q"	10	2 kW	No	1½	£2 6 6	£1 0 6
	WIQ/312	"Q"	12	3 kW	No	1½	£2 6 6	£1 0 6
	WIQ/216	"Q"	16	2 kW	No	1½	£2 6 6	£1 0 6
	IQ/410	"Q"	10	4 kW	Yes	2½	£4 18 6	£2 3 4
SPERRYN & CO., LTD., Moorsom Street Works, Birmingham, 6.	J.46	Withdrawable	7¼	250 W	No	1½	£2 14 10	£1 4 1
	J.47	Withdrawable	9	400 W	No	1½	£2 19 1	£1 6 0
	J.48	Withdrawable	9	500 W	No	1½	£2 19 1	£1 6 0
	J.49	Withdrawable	9	600 W	No	1½	£3 0 11	£1 6 10
	J.52	Withdrawable	10½	750 W	No	1½	£3 4 4	£1 8 4
	J.2	Withdrawable	12	1 kW	No	1½	£3 8 7	£1 10 2
	J.4	Withdrawable	15½	1½ kW	No	1½	£3 12 3	£1 11 2
	J.6	Withdrawable	17	2 kW	No	1½	£3 19 7	£1 15 0
	J.11	Withdrawable	7¼	250 W	No	1½	£2 2 2	£0 18 6
	J.13	Withdrawable	9	400 W	No	1½	£2 5 5	£1 0 0
	J.15	Withdrawable	9	500 W	No	1½	£2 5 5	£1 0 0
	J.17	Withdrawable	10½	600 W	No	1½	£2 6 11	£1 0 8
	J.19	Withdrawable	12½	750 W	No	1½	£2 9 6	£1 1 9
	J.21	Withdrawable	15½	1 kW	No	1½	£2 12 1	£1 2 11
	J.23	Withdrawable	17	1½ kW	No	1½	£3 4 2	£1 8 3
	J.25	Withdrawable	20½	2 kW	No	1½	£3 11 6	£1 11 6

Catalogues and Lists

HEATING EQUIPMENT.—Leaflet describing Dulrae radiant heating which can be incorporated into the structure of floors, ceilings or walls and Medray radiant heating panels.—**Dulrae, Ltd.,** Griffin Lane, Aylesbury, Bucks.

POCKET TESTER.—Leaflet describing the Elge "Radio Pen" pocket tester for voltage testing and polarity indications, spark plug testing and radio signal tracing, etc.—**Mercia Enterprises, Ltd.,** Allesley Old Road, Coventry.

RESISTORS.—Leaflet illustrating and describing the "F.P. Service" resistors for industrial, traction, power station, marine and similar applications.—**Fawcett-Preston & Co., Ltd.,** Bromborough, Cheshire.

SELF-LOCKING NUTS. — Catalogue illustrating and describing the range of "Philidas" self-locking nuts.—**Whitehouse Industries, Ltd.,** Ferrybridge, Knottingley.

STREET LIGHTING. — Illustrated brochure dealing with an oval bowl refractor lantern for group "A" roads.—**Holophane, Ltd.,** Elverton Street, London, S.W.1.

SWITCHGEAR. — Illustrated brochure giving particulars of the "Load-Break" high voltage outdoor isolating switches.—**Line Equipment, Ltd.,** 32, Queen Victoria Street, London, E.C.4.

Illustrated and priced 8-page catalogue of the company's range of ironclad switchgear.—**Vincent Switchgear Manufacturing Co., Ltd.,** Sampson Road North, Birmingham, 11.

TELEPHONE.—Leaflet (1383/E) relating to the "Buttinski" hand telephone.—**Automatic Telephone & Electric Co., Ltd.,** Strowger House, Arundel Street, London, W.C.2.

TRAFFIC BARRIER.—Illustrated leaflet and a folder giving constructional details of the company's electrically actuated traffic barrier.—**R. B. Pullin & Co., Ltd.,** Phœnix Works, Great West Road, Brentford, Middx.

VOLTAGE REGULATOR.—Leaflet describing the "Sabir" general purpose automatic a.c. voltage regulator.—**Mercia Enterprises, Ltd.,** Godiva House, Allesley Old Road, Coventry.

WATER HEATERS.—Price list giving particulars of the company's range of immersion heaters, lagging jackets and flanges and fittings.—**Hotpoint Electric Appliance Co., Ltd.,** Crown House, Aldwych, London, W.C.2.

WIRES AND CABLES. — Brochure (451C) listing the company's range of winding wires and insulated cables and flexibles together with a series of six leaflets dealing with resistance wires, textile and synthetic fibre insulated round wires, strips, and strands and other wires produced by the company.—**Concordia Electric Wire & Cable Co., Ltd.,** Long Eaton, Nottingham.

GENERATION AND DEVELOPMENT

Higher Rate Payments

Rate payments by the Midlands Electricity Board are expected to increase from £800,000 this year to about £1,300,000 in 1960 under the new rating assessments. This was stated by the chairman, Mr. W. S. Lewis, when he addressed the Electricity Consultative Council at Birmingham last week. He said that the present payments were not made to local authorities but under the new arrangements a certain amount would be paid direct on an agreed formula.

Mr. Lewis also referred to the cuts in capital allocations, saying that in the case of the Midlands Board expenditure between now and next March had been cut by £600,000. He gave an assurance that rural development would still get a fair share of the capital available.

Asked if anything could be done to reduce the "enormous cost" of meter reading, billing and accounting, Mr. Lewis said: "We have done everything we can to cut the cost of meter reading. We are now making further efforts in certain directions. Careful study is being given to the introduction of computers and things like that. You never know, in a few years' time there may be no meter reading; it may be done automatically."

Claim Against River Board Rejected

A claim by the Central Electricity Authority against the Cumberland River Board for £44,000 damages was recently rejected by a land tribunal. The claim was in respect of damage to the river wall built for the erection of the Willow Holme power station. Mr. Erskine Simes, Q.C., who sat with Mr. B. H. Bailey, said the tribunal found that the Authority had failed to adduce any evidence pointing conclusively to the work done by the Board being the cause of the damage complained of. Costs were awarded to the River Board.

Generating Plant Extensions

New plant installed by the Central Electricity Authority last month included a 65 MW Metropolitan-Vickers turbo-alternator and 32 MW equivalent Mitchell boiler at Portishead "B"; a 100 MW Babcock & Wilcox boiler at Castle Donington; a 19 MW Richardsons Westgarth boiler at Mexborough; and a 31 MW C. A. Parsons set at East Yelland.

North West's 20,000th Farm Connected

A farm at Dolphinholme, seven miles from Lancaster, is the 20,000th to be connected in the North Western Electricity Board's area and to mark the occasion an official visit was arranged for the switching on last Wednesday. Afterwards a visit was paid to a farm at Barnacre, in the same locality, where bale hay drying is carried out electrically and the installation is, at the moment, believed to be the largest of its kind in the country.

Northfleet-Dungeness Supergrid Line

The *Kentish Express* reports that wayleave officers of the Central Electricity Authority have made the first approaches to landowners for permission to erect towers for the proposed supergrid line from Northfleet to Dungeness to connect with the cross-Channel cable. The Executive Committee of the Kent Branch of the National Farmers' Union has expressed "concern" over the pylons and one member has complained that the Authority is offering only 3s 6d per pylon a year to farmers whose land will be used.

New L.E.B. Substation

The work of building a new L.E.B. substation at King Henry's Walk, Dalston, London, is finished, and commissioning will take place very shortly. This substation is a new bulk supply point in the London Electricity Board's Northern District and reinforces the supply in an area which has a growing mixed industrial and domestic load. The substation is designed to operate without attendants and is served by two 66 kV feeders from Islington generating station.

The four 66/11 kV 15 MVA Hackbridge & Hewittic transformers are fitted with Metropolitan-Vickers on-load tap-changing gear. Initially the transformers will be run in pairs on the two feeders, protected by remote circuit-breakers at the power station. Provision is made for future extensions to the installation embodying circuit-breakers and further isolating gear, to enable three of the transformers to be supplied from one feeder.

This type of substation with the isolators and bus-bars out of doors is unusual in the London area. The horizontal double break isolators, supplied by Switchgear & Equipment, Ltd., are mounted on the flat roofs of the transformer houses. Each isolator has two sets of interlocked line-discharge earth blades; the operating handles and auxiliary switches are mounted at ground level. Current is carried between the isolators and the transformers through roof mounted bushings. The roof-top installation has a rated through-fault capacity of 21·9 kA r.m.s.

As the roofs are surfaced with asphalt which could soften in hot weather, each isolator phase is mounted on a separate concrete plinth which projects through the waterproofing. The facades of the transformer houses are built up above roof level to conceal the isolating gear from the nearby thoroughfare.

Inquiry into Scottish Scheme

The Secretary of State for Scotland has appointed Mr. R. S. Johnston, Q.C., to hold a public inquiry into the North of Scotland Hydro-Electric Board's Construction Scheme No. 30 (Strathfarrar and Kilmorack Project). The scheme provides for the harnessing of the waters of the Rivers Farrar and Beauly for the production of 261 million kWh annually in four power stations. The estimated cost is £14·25 million.

Transport Route Conversion

South Shields Town Council is to replace trolley-buses on the Coast Road route with motor-buses. While trolley-buses are generally cheaper to operate than motor-buses, the deterioration of overhead equipment on the Coast Road route caused by sea air and fog has made the route too costly to maintain.

Roof-top view of the four transformer houses at the new L.E.B. substation at King Henry's Walk, Dalston, showing the "SE" isolators, roof bushings, and the way the gear has been screened from view by brickwork

Financial Section

STOCKS and SHARES

STOCK EXCHANGE markets have been lifeless over the past week. The normal flow of funds for investment seems to have been checked not only by uncertainties arising from the Government's anti-inflation policy, but by the withholding of cash resources in readiness for capital issues on a major scale by two of the giant oil groups. Wall Street's influence has not been particularly stimulating in the absence of any very positive response there to a lowering of interest-rates by American banks. In the electrical markets the main interest has been in shares connected with the report of the Italian order for an atomic power station from the Nuclear Power Plant Company.

Nuclear Power Shares

Although dull market conditions were against any very active reactions to reports of the Italian order, there were improvements in shares of most of the firms associated in the Nuclear Power Plant Co. Both C. A. Parsons and A. Reyrolle added 1s 3d to the previous week's gains of 2s 6d. Clarke Chapman followed up an earlier advance of 11s 3d with another of 10s, reaching £7. Richardsons Westgarth were dealt in above the official quotation of 14s 6d. There were gains also in the shares of engineering companies concerned with the other atomic power groups, Head Wrightson, International Combustion and John Thompson all being 1s or so to the good. Elsewhere, Duport were raised to 18s 6d after the declaration of a final dividend, making a total of 25 per cent (as before, but on larger capital) and the proposal of a 100 per cent scrip issue. Plessey were on the dull side, as were some of the cable shares, but Hoover recovered another 1s to 33s. Hackbridge & Hewittic changed hands up to 10s 6d after the interim report of improving profits.

E.M.I. Accounts

Full accounts now available from Electric & Musical Industries bear this time the reorganisation expenses involved in the agreement with Thorn Electrical Industries, under which the manufacture of domestic radio and television sets has been transferred to a jointly owned company operating mainly in the Thorn factories. Special expenditure under this and other non-current headings is entered at £936,000. Leaving that item out of account, the trading profit of £4·7 million is little short of double the previous year's figure. After charging the reorganisation expenses and over £2½ million for taxation, the net group profit is still some £240,000 to the good at £1·1 million. The amount of the ordinary dividend is shown to be covered three times over on that basis, and as much as six times by normal earnings. It is clear from Mr. Lockwood's review that increased sales of gramophone records abroad and at home contributed substantially to the results.

Johnson & Phillips

Johnson & Phillips £1 shares were not affected adversely by the decision

Price Changes in

Company or Board	Nom. Value	Middle price 25th Nov.	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield %	1957 Highest	1957 Lowest
Gilt-edged Stocks						£ s. d.		
Brit. Elec. 1968/73	100	71½		3	3	4 4 0	80	70
Brit. Elec. 1974/77	100	68		3	3	4 8 3	78½	66
Brit. Elec. 1976/79	100	71	+½	3½	3½	4 18 6	81½	70
Brit. Elec. 1974/79	100	81½	−½	4¼	4¼	5 4 3	92½	79½
Overseas Electric Supply								
Calcutta Elec.	£1	16/-		6†	6·8†	8 10 0†	19/-	15/-
East African Power	£1	20/-		7	7½	7 10 0	21/-	19/-
Nigerian Elec.	£1	16/6		10	10	12 2 6	18/6	16/6
Perak Hydro-Elec.	£1	16/-		10	12½	15 12 6	18/-	13/3
Electrical Shares								
Aberdare Cables	5/-	10/3		17½	17½	8 10 9	12/-	9/9
Aerialite	1/-	5/6		48	51½	9 7 3	6/9	4/9
Allen, W. H.	£1	35/-	−1/9	10	10	5 14 3	47/3	33/6
Anglo-Portuguese Tel.	£1	21/9	+6d	8	8	7 7 3	27/6	20/6
Aron Elec. Ord.	£1	55/-		15	15	5 9 0	60/-	53/6
Assoc. Elec. Ord.	£1	51/3	−1/3	15	15	5 17 0	73/-	49/6
Automatic Tel & El.	£1	55/-x.r.		15	17	6 3 9	75/-	54/6
Babcock & Wilcox	£1	60/-		15	15	5 0 0	82/6	54/9
Bakelite	10/-	21/3	−1/-	16	15	7 1 3	24/6	20/9
Baldwin, H. J.	2/-	4/-		20	20	10 0 0	5/-	3/10½
Berry's Electric	5/-	6/-		—	10	8 6 9	6/6	5/6
British Aluminium	£1	42/-	−1/-	12	12	5 14 3	71/3	38/9
Brit. Elec. Traction: Def. Ord. "A"	5/-	19/-	+1/-	22½	25	6 11 6	25/-	17/-
B.I. Callender's	£1	42/3	+3d	12½	12½	5 18 3	55/-	40/9
B.I. Callender's 6% Pref.	£1	20/-		6	6	6 0 0	21/9	19/-
British Tabulating	£1	40/-	+1/3	9	9	4 10 0	56/3	37/6
British Thermostat	5/-	21/3		25	25	5 17 9	27/6	22/6
British Vac. Cleaner	5/-	5/-		15	10	10 0 0	8/-	5/-
Brook Motors	10/-	32/6		25	25	7 13 9	37/6	30/-
Bulgin, A. F.	1/-	4/9	−3d	50	40*	8 8 6	5/6	4/-
Burco Dean	5/-	13/3		22½	20	7 11 0	14/-	8/9
Cable & Wireless: Ord.	5/-	10/3	+9d	10	10	4 17 6	12/6	9/6
4% Loan	100	91½		4	4	4 7 6	92½	89
Chloride El. Storage "A"	£1	58/9		17½	17½	5 19 3	68/9	55/9
Clarke Chapman	£1	140/-	+10/-	22½	27½	3 18 6	9	5⅞
Cole, E. K.	5/-	17/3	+6d	17½	17½	5 1 6	23/6	16/6
Cossor, A. C.	5/-	5/3		Nil	2½	2 7 6	7/3	5/-
Crabtree	10/-	23/9		20	20	8 8 6	26/-	23/3
Crompton Parkinson Ord.	5/-	15/-		16	16	5 6 9	17/9	14/-
De La Rue	5/-	23/6	+9d	30	35	7 9 0	24/9	16/3
Decca "A"	4/-	24/3		43¾	43¾	7 4 3	32/3	22/-
Desoutter	5/-	31/6		30	32½	5 3 3	35/6	27/6
Dewhurst	2/-	7/-		30	16½*	4 12 9	7/9	5/9
Dictograph Tel.	2/-	5/9		20	20*	6 19 3	6/3	5/3
Dubilier Condenser	1/-	3/6	+3d	30	30	—	8/1½	3/3
Duport	5/-	18/6	+6d	25	25	6 15 3	21/-	17/-
E.M.I.	10/-	28/-	+3d	15	15	5 7 3	36/-	23/9
Electrical Components	5/-	7/3		25	12½*	8 12 6	8/-	6/6
Elec. Construction	£1	23/9		8½	8½	7 3 3	27/6	21/9
Elliott-Automation	5/-	12/6		—	10‡	4 0 0	12/6	10/3
Enfield Cable Ord.	£1	14/-	−6d	Nil	Nil	Nil	21/6	13/-
English Electric	£1	51/3		12½	14	5 9 6	65/-	47/6
English Electric 3½% Pref.	£1	12/3		3⅜	3⅜	6 2 6	14/3	11/3
Ericsson Tel.	5/-	19/6		20†	22†	2 16 6*†	25/-	17/-
Ever Ready	5/-	15/-	−3d	35	37½	6 5 0*	20/-	14/3
Falk Stadelmann	£1	36/3		17½	17½	9 13 0	40/6	35/-

The above quotations are based upon middle prices in the Stock Exchange Daily Official List.
* After scrip issue. † Free of income tax. ‡ Dividend indicated.

of the directors to break a 24-year sequence in recommending no interim dividend on account of the current year. After dipping momentarily to 17s 6d, the official quotation was restored to 18s 9d, and in the market the price was rather higher. Output and trading results are stated to have improved in the first half of this year, but the fall in copper prices persisted as a factor in restricting profits. Margins remain small, and the curtailment of capital projects in the nationalised and other industries is creating uncertainty, but since June profits have been at a better level and the directors feel reasonably confident that trading results will continue to show improvement. For 1956 the company paid interim and final dividends each of 5 per cent, and the annual results were published in May.

Electrical Investments

Company or Board	Nom. Value	Middle price 25th Nov.	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield % £ s d	1957 Highest	1957 Lowest
Electrical Shares—continued								
G.E.C. Ord.	£1	41/3		14	12½	6 1 3	58/9	38/9
G.E.C. 6½ Pref.	£1	20/9	+9d	6½	6½	6 5 3	23/6	19/6
General Cables	5/-	12/6		30	30	12 0 0	15/6	11/6
Greenwood & Batley	£1	47/-		17½	17½	7 9 0	51/3	45/3
Hackbridge Holdings	5/-	11/9		30	20	8 10 3	21/9	11/3
Hackbridge & Hewittic	5/-	10/-		23	20	10 0 0	16/-	10/-
Head Wrightson	5/-	18/6	+1/3	20	22½	—	24/3	16/6
Heatrae	2/-	4/9		15	15	6 6 6	4/9	4/-
Henley's	10/-	11/6	−3d	11½	11½	10 0 0	17/-	11/3
Holophane	5/-	21/9		30	37½	8 12 3	26/3	17/-
Hoover	5/-	33/-	+1/-	50	50	7 11 6	44/-	24/9
I.C.I.	£1	38/-	−1/-	10	10	5 5 3	46/6	36/3
Intl. Combustion	5/-	21/-	+1/-	20	22½	5 7 3	30/-	19/3
Johnson & Phillips	£1	18/9	−9d	15	10	10 13 3	34/6	18/9
Lancashire Dynamo	£1	33/9	−1/3	11	11	6 10 3	45/9	33/6
Laurence, Scott	5/-	14/3		15	15	5 5 3	19/9	13/9
Lister, R. A.	£1	25/-		10	10	8 0 0	33/9	23/3
London Elec. Wire	£1	41/3	−9d	12½	12½	6 1 3	53/9	40/9
Lucas, J.	£1	29/3	−9d	7½	7½	5 2 6	36/6	27/6
Marconi Marine	£1	31/3		10	10	6 8 0	37/-	31/-
Marryat & Scott	2/-	10/6		30	35	6 13 3	13/-	8/-
Mather & Platt	£1	47/6		15	15	6 6 3	63/9	47/-
Metal Industries	£1	23/3		Nil	9	7 14 9	30/-	20/3
Midland Elec. Mfg.	£1	47/6		12½	12½	5 5 3	52/6	45/-
Morphy-Richards	4/-	15/-		50	20*	5 6 9	20/-	11/6
Murex	£1	58/3		20	20	6 17 3	79/6	58/3
Newman Ind.	2/-	2/9		10	10	7 5 6	2/9	2/1
Oldham & Son	1/-	2/6		17½	17½	7 0 0	3/-	2/3
Parnall (Yate)	5/-	6/3		12	12	9 12 0	8/9	5/9
Parsons, C. A.	£1	51/3	+1/3	8⅛	7⅛*‡	—	71/3	45/-
Plessey	10/-	64/-	−1/6	30	30	4 13 9	86/3	61/-
Pye "A" Deferred	5/-	13/9		12½	12½	4 11 0	20/-	12/-
Reyrolle	£1	77/6	+1/3	16½	17½	4 10 3	110/-	72/-
Rheostatic	4/-	7/9		18½	12½*	6 9 0	10/-	7/-
Richardsons Westgarth	5/-	14/6		16⅝	16⅝	5 15 0	20/-	13/6
Scottish Cables	4/-	13/3	−6d	27½	27½	8 6 0	19/3	13/3
Simon-Carves	5/-	23/9		28½	20*	4 4 3	36/3	23/9
Smith (England), S.	4/-	14/6		17½	20	5 10 3	16/-	12/9
Southern Areas	£1	11/3		7½	7½	13 6 9	20/-	11/3
Strand Elec.	5/-	6/3		15	15	12 0 0	8/-	5/9
Sturtevant	5/-	17/9	−3d	15†	15†	4 4 6†	27/-	18/-
Sun Elec.	£1	43/9		25	25	11 8 6	45/-	42/-
Switchgear & Cowans	5/-	9/9		25	25	12 16 3	15/6	9/9
Taylor Tunnicliff	5/-	12/3	+6d	15	15	6 2 6	13/9	11/9
T.C.C.	10/-	37/6		25	25	6 13 3	41/3	35/-
T.C. & M.	£1	24/6		8½	8½	6 18 9	31/-	24/-
Telephone Mfg.	5/-	5/3		10	10	9 10 6	8/-	5/3
Telephone Rentals	5/-	9/6		12½	12½	6 11 6	12/6	9/6
Thompson (John)	5/-	25/-	+1/-	25	25	5 0 0	37/-	23/6
Thorn Elec.	5/-	20/9		15	17½	4 4 3	26/3	16/3
Thornycroft	£1	26/6	+1/-	12½	12½	9 8 9	37/6	21/3
Tube Investments	£1	55/3	+1/6	13⅓	15	5 8 6	70/-	51/3
Vactric	5/-	16/3	+6d	17½	25	7 13 9	23/9	12/9
Veritys	5/-	7/-	−9d	12½	12½	8 18 6	9/3	7/9
Walsall Conduits	4/-	11/3		20	20	7 2 3	15/-	11/-
Ward & Goldstone	5/-	27/-	+1/6	35	40	3 14 3‖	29/-	18/6
Watford	2/-	5/9		25	25	8 13 9	6/9	5/9
Westinghouse	£1	32/3	−3d	18	9‡*	5 11 6	41/3	28/9
West, Allen	5/-	10/3	+3d	15	15	—	13/6	9/6
Wolf Electric	5/-	9/-		20	20	5 11 0*	13/9	8/9

Company News

Dewhurst & Partner 2s shares were raised in the market to 7s 3d after the announcement of a further substantial increase in earnings and of a final dividend making a total of 20 per cent, against 16⅓ per cent previously. Effects of the credit squeeze upon capital development plans of industry are mentioned in a progress report from Metal Industries as a factor likely to make its mark on this year's earnings. In the period from March to mid-September, however, profits before tax expanded well from £543,000 to £719,000, and this improvement is described by the chairman as giving grounds for sober satisfaction. In the year 1956–57 the net profits of the group, after tax, went over from a loss of over £400,000 to a profit of £800,000, which enabled the company to restore the dividend to 9 per cent, with the addition of a special 5 per cent bonus.

Desoutter Issue

The 5s shares of Desoutter Brothers (Holdings) have been quoted in the market at 30s 6d (the official quotation being 1s higher) since the company's announcement that consent has been obtained to the distribution of a 100 per cent scrip issue in the form of "A" (non-voting) shares. Shareholders are advised not to take this operation as indicating any increase in the overall dividend payment for the current year. Accounts are made up to the end of December, and the results were published last time in February. On the last four occasions there has been as moderate increase in the amount distributed, without any deviation from a strictly conservative dividend policy: last year's payment of 32½ per cent left three-quarters of the £269,000 net profit to be ploughed back.

Automatic Telephone Issue

Early dealings in the new Automatic Telephone & Electric £1 ordinary shares took place at a premium of about 3s 6d on the price of 52s 6d at which 855,600 shares are offered to existing holders of the company's ordinary and deferred stocks. A first instalment of 20s per share falls due for payment by 5th December, and the balance of 32s 6d by 17th January, until when a purchase can be made without the usual expense of transfer stamp duty. A 4 per cent payment is forecast on the new shares on account of the current year, and on the basis that the full year's dividend will be maintained at 17 per cent on the increased capital there is a prospective yield of just over 6 per cent at the all-in price of 56s.

REPORTS and DIVIDENDS

Crompton Parkinson, Ltd.—The report and accounts for the year ended 30th June last, now issued, confirm the preliminary figures given in our issue of 8th November.

In his circulated statement, Mr. Albert Parkinson (chairman) refers to changes on the board (reported in the "Personal and Social" section of this issue). After referring to the proposals for capital reorganisation (*Electrical Review*, 8th November), he deals with the company's overseas interests, in the course of which he says that the activities of the Australian company have to some degree reflected current conditions in that country which during the past year have witnessed a slowing down in the rate of economic growth and a fall in private investment. This has particularly affected the demand for some of the larger plant in which their company is interested.

In India, the picture remains one of intense activity. The economic advisability for India to rely to the greatest possible extent on home-produced manufactures is facing the factory with a challenge which it is doing its utmost to meet in the interests of that country. The purchase of a site at Kanjur, near Bombay, has now been completed and building work has commenced upon a new works which will greatly improve the capacity of the Indian manufacturing company. Since the close of the financial year negotiations have been concluded for the sale of the factory buildings and site belonging to the jointly owned South African company —African Electrical Manufacturers Pty., Ltd.

Whilst the Canadian switchgear factory at Brantford, Ontario, has already proved that it can manufacture profitably, it is working on an order book which is insufficient for its most efficient operation. They believe their problems reflect, at least in part, the pause which is at present taking place in the phenomenal economic and industrial growth of the country, and directors are of the opinion that, with the inevitable resurgence of Canadian business progress, an increased flow of orders will enable the Brantford factory to justify to the full its early promise.

During the year they have become interested, with other leading British companies, in a consortium, formed as a limited company under the name of Rustyfa, Ltd., which has as its purpose the supply of a complete motor tyre factory to the U.S.S.R. which will be the largest of its kind in Europe. A contract has already been signed and they are hopeful that this new arrangement will provide a substantial outlet for many of their plant products.

Turning to United Kingdom activities, Mr. Parkinson refers to modernisation of the various factories and equipment of the group and says that at Chelmsford a large switchgear extension has been completed. At Derby a new building has been erected to deal with the increasing demand for plastic-covered cable.

In the field of atomic power they have joined as a founder member, with a number of other well-known companies, Atomic Power Constructions, Ltd. This company now has available all the technical, productive and financial resources necessary to enable it to take a leading part both in the expansion of the country's atomic power programme and in the export of nuclear power equipment.

Referring to the company's interest in industrial truck manufacture, Mr. Parkinson says that they and the Austin Motor Co., Ltd., have now been joined by the Clark Equipment Co., of America, through its subsidiary company, Clark Equipment International C.A., which will augment the knowledge and experience of the English companies in the automotive and electrical fields of material handling equipment; the three companies are now equal partners in I.T.D., Ltd. The business of Austin Crompton Parkinson Electric Vehicles, Ltd., has now been concentrated at Leicester.

With regard to the outlook, the unexecuted order book is in a healthy condition and has been well maintained since the end of the financial year.

Electric & Musical Industries, Ltd.—In his review of the year ended 30th June last, Mr. J. F. Lockwood (chairman) says that the total sales of the group rose by £8 million to £61 million, an increase of 15 per cent over the previous year. A new company, the British Radio Corporation, Ltd., which is jointly owned by Thorn Electrical Industries, Ltd., and themselves, was formed to take over the design and marketing of the domestic radio and television of Ferguson, "His Master's Voice" and Marconiphone, and began operations on 1st June last. The manufacture and sale of the other products of the domestic electronics division have been transferred to E.M.I. Sales & Service, Ltd.

Dealing with research, the chairman says that they are continuing with their research in colour television. They have developed a new photo-surface for use in camera tubes and this has produced a notable increase in the sensitivity of the C.P.S. Emitron tube. These new tubes are now being tried by the B.B.C., the I.T.A. contractors, and German broadcasting authorities.

Referring to the activities of the United Kingdom companies in the group, the chairman says that E.M.I. Electronics, Ltd., is now able to offer, under the name of "Emidec," a series of computers with characteristics well in advance of those of any other existing machines. It is supplying the B.B.C. with high power transmitters for radiating television in the higher frequency bands, and with low power transmitters for very high frequency sound. E.M.I. Sales & Service, Ltd., has again substantially increased its output of magnetic recording tape. Despite intensified competition in the domestic appliances market and the exceptionally mild winter, the sales of H.M.V. irons and reflector fires were maintained at a good level, while sales of convector heaters proved the highest ever achieved by the company. Mr. Lockwood concludes with a review of the group's overseas interests.

Johnson & Phillips, Ltd., have decided not to pay an interim ordinary dividend in respect of the current year. In making the announcement, the directors state that for the first half of the year the output and the trading results were much improved as compared with the latter half of 1956 but the effect of the copper position, referred to in the directors' statement in May, is still being felt and for the six months ended 30th June last the net profit was small. Since then values of orders and output have been well maintained and, because of the substantial reductions in copper prices, the physical volumes are noticeably greater. Despite low profit margins the profit earned since June is larger than for the previous half-year.

As to the remainder of this year, they feel reasonably confident that the rate of order input will be maintained and that the trading results will continue to show an improvement; but profit margins, particularly in cables, are low and the effect of the capital restrictions upon the nationalised industries and upon the general level of industrial activity cannot be known.

The work of establishing the Switchgear and Capacitor Departments in the new Elizabeth Works is now substantially complete and the considerably greater and more efficient productive capacity is already showing encouraging results though the full effect will not be seen until next year.

Vent-Axia, Ltd., has declared an interim ordinary dividend of 10 per cent. This is equivalent to last year's interim dividend of 30 per cent as the ordinary capital was recently trebled by a two-for-one capitalisation of reserves. The unaudited group profit for the half-year to 30th September last, before taxation, was approximately £127,834, as compared with £122,094 for the corresponding period last year.

Oliver Pell Control, Ltd., reports that after providing £25,844 for taxation, the profit for the year to 31st March last amounts to £26,310, as compared with £19,552 for the previous year. It is proposed to pay

an ordinary dividend for the year of 6 per cent (against nil), and to carry forward £65,267 (against £45,237 brought in).

Metal Industries, Ltd., announces a profit, before taxation, of £719,000 for the 24 weeks ended 14th September last. This compares with £543,000 for the corresponding period of 1956. Sir Charles Westlake (chairman) warns stockholders, however, that the restrictions on credit, the consequent slowing down in capital projects and the world affairs may well find reflection in the full year's figures.

Aberdare Cables Africa, Ltd.—The net profit for the year to 30th June last, after providing £13,440 for taxation, is £56,678, as compared with £59,435 for 1955-56. It is proposed to pay a dividend for the year of 7½ per cent on increased capital (against 10 per cent on the old capital). The balance carried forward is £1,929 (against £6,704 brought in).

Peto Scott Electrical Instruments, Ltd.—At the extraordinary general meeting which followed the recent annual general meeting, the resolution to acquire the whole of the issued share capital in the Conrad Electrical Co., Ltd., was approved.

Enfield Rolling Mills, Ltd., has declared an interim dividend of 2½ per cent on capital of £4,160,000 (against 5 per cent on £1,555,000).

Worthington-Simpson, Ltd., are paying an interim dividend of 10 per cent (unchanged).

New Companies

Setag Electrical Co., Ltd.—Registered 31st October. Capital £100. Electrical engineers and contractors, radio dealers, etc. Directors: C. Crossland and Mrs. Lilian A. Crossland. Regd. office: 27, Princedale Road, Holland Park, W.11.

E. Kinsey & Sons, Ltd.—Registered 11th November. Capital £5,000. Electrical and mechanical engineers, etc. Directors: E. Kinsey and Bessie Kinsey. Regd. office: 94, Chapel Street, Leigh, Lancs.

Nuclear Carbon, Ltd.—Registered 8th November. Capital £100. Machiners of carbon and graphite blocks for use in the construction of nuclear power stations, etc. Solicitors. Slaughter & May, 18, Austin Friars, E.C.2.

Hazelhurst Insulation Co., Ltd.—Registered 11th November. Capital £6,000. Manufacturers and repairers of and dealers in insulators and insulating materials, dynamos, armatures, etc. Directors: J. Ashworth, M. R. Rothwell, T. P. Collins and Helen Grogan. Regd. office: Wood Hey Works, Wood Hey Road, Holcombe Brook, Bury.

Central Electric (Norwich), Ltd.—Registered 11th November. Capital £2,000. Manufacturers of and dealers in radio and television sets, etc. Directors: K. F. Yaxley and H. E. Yaxley. Regd. office. 73, Magdalen Street, Norwich.

Goddard Bros., Ltd.—Registered 19th November. Capital £2,000. Manufacturers of and dealers in artificial lighting apparatus, electrical plant, etc. Directors: W. J. Goddard and S. E. Goddard. Regd. office: 267, High Street, Brentford, Mdx.

Refrigeration (Doncaster), Ltd.—Registered 18th November. Capital £1,000. Electrical engineers and contractors, etc. Directors: S. I. Ryland and Mrs. Hilda A. Ryland. Regd. office: 33, Thorne Road, Doncaster.

Supervac, Ltd.—Registered 11th November. Capital £100. Manufacturers of and dealers in radio, electrical and mechanical apparatus of all kinds, etc. Directors: R. H. Hatchard, R. C. Crofts and Ruby E. W. Hatchard. Regd. office: Numbers 1, 1a and 2, rear of 28, The Grangeway, N.12.

Autoslave Equipment, Ltd.—Registered 4th November. Capital £2,000. Electronic and electrical equipment engineers and contractors, radio engineers and contractors, etc. Directors: G. Bracken and A. F. Howson. Regd. office: 1-5, Broad Street, Northampton.

Monitored Controls, Ltd.—Registered 15th November. Capital £100. Developers, manufacturers of and dealers in electronic equipment, etc. Regd. office: 9, Staple Inn, W.C.1.

Twickenham Transformers, Ltd.—Registered 15th November. Capital £2,000. General and electrical engineers, manufacturers, workers and dealers in transformers, condensers, etc. E. S. Jay is the first director. Regd. office: 12, St. Albans Avenue, Hanworth, Mdx.

Increases of Capital

British Central Electrical Co., Ltd.—Increased by £10,000, in £1 "A" ordinary shares, beyond the registered capital of £24,500.

W. R. Sykes Interlocking Signal Co., Ltd.—Increased by £100,000, in £1 6 per cent cumulative preference shares, beyond the registered capital of £200,000.

Elliott-Automation, Ltd.—Increased by £6,499,900, in 2,000,000 preference shares of £1 and 17,999,600 ordinary shares of 5s each, beyond the registered capital of £100.

Wandleside Cable Works, Ltd.—Increased by £50,000, in £1 ordinary shares, beyond the registered capital of £100,000.

Rediffusion Vision, Ltd.—Increased by £240,000, in £1 ordinary shares, beyond the registered capital of £1,060,000.

Amphenol (Great Britain), Ltd.—Increased by £99,900, in £1 ordinary shares, beyond the registered capital of £100.

Liquidation

Sleigh & Wood, Ltd., electrical contractors, 16a, Pilgrim Street, Newcastle-upon-Tyne.—Winding up voluntarily. Liquidator, Mr. T. W. Spencer, 16a, Pilgrim Street, Newcastle-upon-Tyne, 1, appointed 31st October. Particulars of claims to the liquidator by 28th November. This notice is purely formal. All claims have been or will be paid in full.

Bankruptcies

E. H. Clegg, Brow Bridge, Greetland, near Halifax, electrical and television engineer.—Receiving order made 12th November on debtor's own petition. Public examination 17th December at the County Court, Prescott Street, Halifax.

C. E. Purcell, 81, Addison Road, London, W.14, electrical contractor, lately residing and carrying on business at 13, Wrotham Road, Gravesend, under the style of Edward Purcell & Son.—Receiving order made 12th November on debtor's own petition.

E. Newland, electrical contractor, 130, Grove Road, Chadwell Heath, Romford, Essex.—Second dividend of 5s in the £, payable at 18, Bentinck Street, London, W.1.

Street Lighting at Crawley

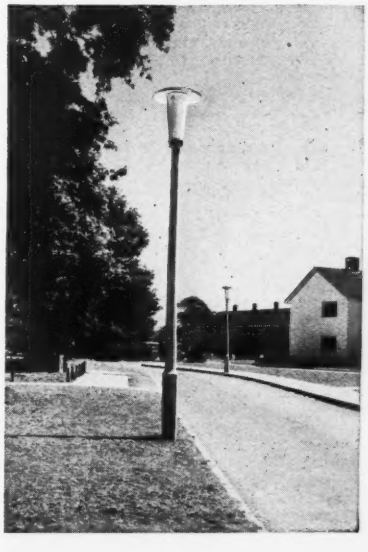
SPECIALLY designed post-top lanterns and concrete columns are included among the wide range of street lighting equipment supplied by the General Electric Co., Ltd., and now installed in the West Green, Three Bridges, Langley Green, Northgate and Tilgate neighbourhoods of Crawley New Town, Sussex.

The special post-top mounting lanterns were designed at the request of Crawley Development Corporation to blend with the contemporary architecture of buildings in the residential neighbourhoods. The design evolved by the G.E.C. is essentially a cone of "Perspex" material held at its lower end by a spigot cap, and at the top by a "mushroom" shaped spinning which houses the tube operating gear. The light emitted by the two vertically mounted "Osram" 2ft 40 W fluorescent tubes is controlled by two vertically mounted, machined "Perspex" reflector plates. For columns the Corporation required a slender type and a design was produced which was accepted by the Council of Industrial Design. The column, now known as the G.E.C. Brevis II B(SB), is built without omitting any of the structural requirements of the specification, or the amount of cover of the steel reinforcements, but the diameter of the duct passing up the column is reduced to ¾in and the dimensions of the gear compartments are restricted to the minimum amount necessary.

The new lanterns and columns are now erected in the Tilgate neighbourhood, and their use will eventually be extended to the whole of the Gossops Green neighbourhood which is to be built shortly.

G.E.C. lanterns used in other areas include the "Two-Forty" (two 2ft 40 W tubes) and "Two-Eighty" (two 5ft 80 W tubes) with "Aeroscreen" mercury lanterns, each housing one 250 W "Osram" lamp, at three large roundabouts on the Brighton by-pass road.

Specially designed G.E.C. post-top mounting lantern



NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (3s 6d each including postage) will be obtainable after 4th December from the Patent Office, 25, Southampton Buildings, London, W.C.2

1953

18969. Ericsson Telephones, Ltd., and Taub, D. M.—Electric signal registering and translating means. 8th November, 1954. (787244.)

33796. Philco Corporation.—Cathode-ray tube apparatus. 4th December, 1953. (787071.)

36204. British Insulated Callender's Cables, Ltd.—Metal coating of aluminium wire. 30th December, 1954. (787116.)

1954

1112. McMurdo Instrument Co., Ltd., and Noon, R. E.—Electrical apparatus. 14th January, 1955. (787323.)

4583. Naimer, H. — Electromagnetic switches. 16th February, 1954. (787072.)

6966. Cinema-Television, Ltd.—Electric circuits including non-linear resistive elements. 10th March, 1955. (787324.)

7250. Kraftanlagen Akt.-Ges.—Devices for use in electric arc welding. 12th March, 1954. (787126.)

8553. Ericsson Telephones, Ltd., and Taub, D. M.—Electrical storage of information. 22nd June, 1955. (787246.)

11077. Koehler Manufacturing Co.—Separators for electric storage batteries. 14th April, 1954. (787074.)

14458. Staatsbedrijf der Posterijen, Telegrafie en Telefonie.—Trunking diagram for an automatic telecommunication system. 17th May, 1954. (787238.)

18181. Standard Telephones & Cables, Ltd.—Travelling wave tubes. 17th June, 1955. (787181.)

19354. Metropolitan-Vickers Electrical Co., Ltd.—Construction of wave-guides. 27th June, 1955. (787329.)

20854. Smith & Sons (England), Ltd., S.—Magnetic amplifiers. 14th July, 1955. (787182.)

21400. Plessey Co., Ltd.—Electric power systems incorporating vibratory interruptors. 24th October, 1955. (787388.)

23991. Electric & Musical Industries, Ltd.—Generation of image signals. 12th August, 1955. (787331.)

24088. Staatsbedrijf der Posterijen, Telegrafie en Telefonie.—Control equipment for an automatic communication system arranged as a link system. 18th August, 1954. (787239.)

24199. General Electric Co.—Electric pulse generators. 19th August, 1954. (787075.)

24501. General Electric Co., Ltd.—Semi-conductor devices. 1st September, 1955. (787389.)

27202. Westinghouse Brake & Signal Co., Ltd., and Walker, A. H. B.—Circuit arrangement incorporating semi-conductor devices. 24th August, 1955. (787333.)

27312. Varian Associates.—Travelling wave electron-discharge device. 21st September, 1954. (787249.)

28256. Siemens-Schuckertwerke Akt.-Ges.—Electric roll-type capacitors. 30th September, 1954. (787183.)

28317. Bauer, H., Eul, H., and Günther, H.—Push-in type electric lampholder. 1st October, 1954. (787334.)

28841. Smith & Sons (England), Ltd., S.—Electromechanical transducers, particularly electromagnetic relays. 10th October, 1955. (787391.)

30693. Iwasaki Tsushinki Kabushiki Kaisha.—Telephone systems. 25th October, 1954. (787251.)

31740. Cole, Ltd., E. K., Cox, V. J., and Reeves, R. J. D.—Recording voltmeters. 11th January, 1956. (787253.)

34143. Automatic Telephone & Electric Co., Ltd.—High speed hunting circuits. 6th October, 1955. (787255.)

36021. General Electric Co., Ltd.—Electrical apparatus. 18th November, 1955. (787341.)

37374. Telephone Manufacturing Co., Ltd.—Electrical capacitors. 24th December, 1954. (787342.)

1955

3169. Arthur, E. M.—Electrical connectors. 2nd February, 1956. (787261.)

5542. Harris, K. E., and Levell, D. A.—Secondary radar systems. 20th February, 1956. (787190.)

7160. Automatic Telephone & Electric Co., Ltd.—Signal transfer circuits employing transistors. 9th March, 1956. (787349.)

7274. British Broadcasting Corporation.—Electronic gating circuits. 25th January, 1956. (787350.)

8803. General Electric Co., Ltd., and Drybrough, D. A. S.—Audio-frequency thermionic valve amplifiers. 26th March, 1956. (787355.)

9097. Westinghouse Brake & Signal Co., Ltd., and Stevens, S. A.—Alternating electric current rectifier assemblies of the dry surface contact type. 8th March, 1956. (787265.)

9939. Riva, A. Da.—Loudspeaking telephone systems. 5th April, 1955. (787196.)

11673. International Business Machines Corporation.—Electronic delay circuit for use as a digital data store. 22nd April, 1955. (787085.)

13116. Ashmor Electrical, Ltd., Morgan, R. J. B., and Washington, L. F.—Starting switches for low voltage electric fluorescent lamps. 7th May, 1956. (787132.)

13355. Compagnie Générale de Télégraphie sans Fil.—Velocity modulation tubes. 9th May, 1955. (787271.)

21033. General Electric Co.—Control of electric heating circuits. 20th July, 1955. (787204.)

24602. Robertshaw-Fulton Controls Co.—Thermostatic electric control device. 26th August, 1955. (787094.)

25413. Philips Electrical Industries, Ltd.—Trigger circuit arrangements comprising two transistors. 5th September, 1955. (787141.)

26983. Siemens & Halske Akt.-Ges.—High frequency electron-tube arrangements. 21st September, 1955. (787290.)

28541. Sulzer Freres Soc. Anon.—Controlling the deposition of salts in the tube systems of steam generators. 6th October, 1955. (787143.)

30674. Pressed Steel Co., Ltd.—Electric lampholders. 26th October, 1955. (787148.)

33365. Creed & Co., Ltd.—Power supply equipment for synchronous motors. 22nd November, 1955. (787366.)

33620. Reiter, R.—Process for separating the constituents of mixtures by means of magnetic and electric fields. 23rd November, 1955. (787367.)

34913. Allmänna Svenska Elektriska Aktiebolaget.—Capacitor grading in lightning arrestors. 6th December, 1955. (787398.)

1956

1608. Sperry Products, Inc.—Automatic ultrasonic inspection apparatus. 17th January, 1956. (787217.)

12359. General Electric Co.—Regulated polyphase power supply systems. 23rd April, 1956. (787312.)

13280. Coronel, H. S.—Instruments improving the operating of telephones in connection with telephone amplifiers. 10th September, 1956. (787165.)

13557. Telefonaktiebolaget L. M. Ericsson.—Devices for the equal limiting of positive and negative amplitudes of signals. 2nd May, 1956. (787315.)

13853. Western Electric Co., Inc.—Cable seam soldering apparatus. 4th May, 1956. (787166.)

15564. Standard Telephones & Cables, Ltd.—Manufacture of electric-discharge devices. 18th May, 1956. (787317.)

18320. Fichtel & Sachs Akt.-Ges.—Control switches for electrically-actuated clutches. 13th June, 1956. (787318.)

18528. Compagnie Industrielle des Téléphones.—System for setting telecommunication switches by marking. 15th June, 1956. (787170.)

20489. Mock, W.—Electric condensers. 2nd July, 1956. (787319.)

TRADE MARKS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to 6th December:—

AESC. Nos. B756,449, B756,451 and B756,452 (designs). Class 7. Cranes, elevating apparatus, conveyors (machines), lifting apparatus for loading and unloading merchandise, electric motors (not for land vehicles), electric generators, air compressors, automatic discharging hoppers, capstans, power operated winches, power operated grapnels, pumps and charging platforms.—A. E. Smith Coggins, Ltd., George's Dock Building, George's Dock Way, Liverpool, 3.

LADYBIRD. No. 760,513. Class 9. Domestic electrical appliances; electric vacuum cleaning apparatus; and parts.—Ladybird Appliances, Ltd., trading also as Ladybird Ami, Reliance Works, Oxford Road, Wokingham, Berks.

NT (design). No. 761,613. Class 9. Telephonic apparatus; and intercommunication and light-signalling instruments and apparatus, all for use in offices, factories and the like. —New Time and Telephone Service, Ltd., 44-50, Osnaburgh Street, London, N.W.1.

AURETTE. No. 767,532. Class 10. Hearing aids for the deaf, and parts.—Multitone Electric Co., Ltd., 12-20, Underwood Street, London, N.1.

Street Lighting Plans

Bermondsey Council has received formal consent to borrow £27,020 for improved street lighting.

The Ministry of Transport has approved **Billingham-on-Tees** U.D.C.'s scheme for improving the lighting of trunk road A.1 between Sandy Lane and the King's Arms.

Bradford Finance and General Purposes Committee is being asked to support a proposal to spend over £50,000 on street lighting improvements in various parts of the city during the financial year 1958-59.

Sanction has been obtained by **Chesterfield** Town Council to borrow £4,000 for installing sodium street lighting in Hady Hill.

East Barnet Corporation has approved expenditure of £12,475 on the provision of improved lighting in various streets.

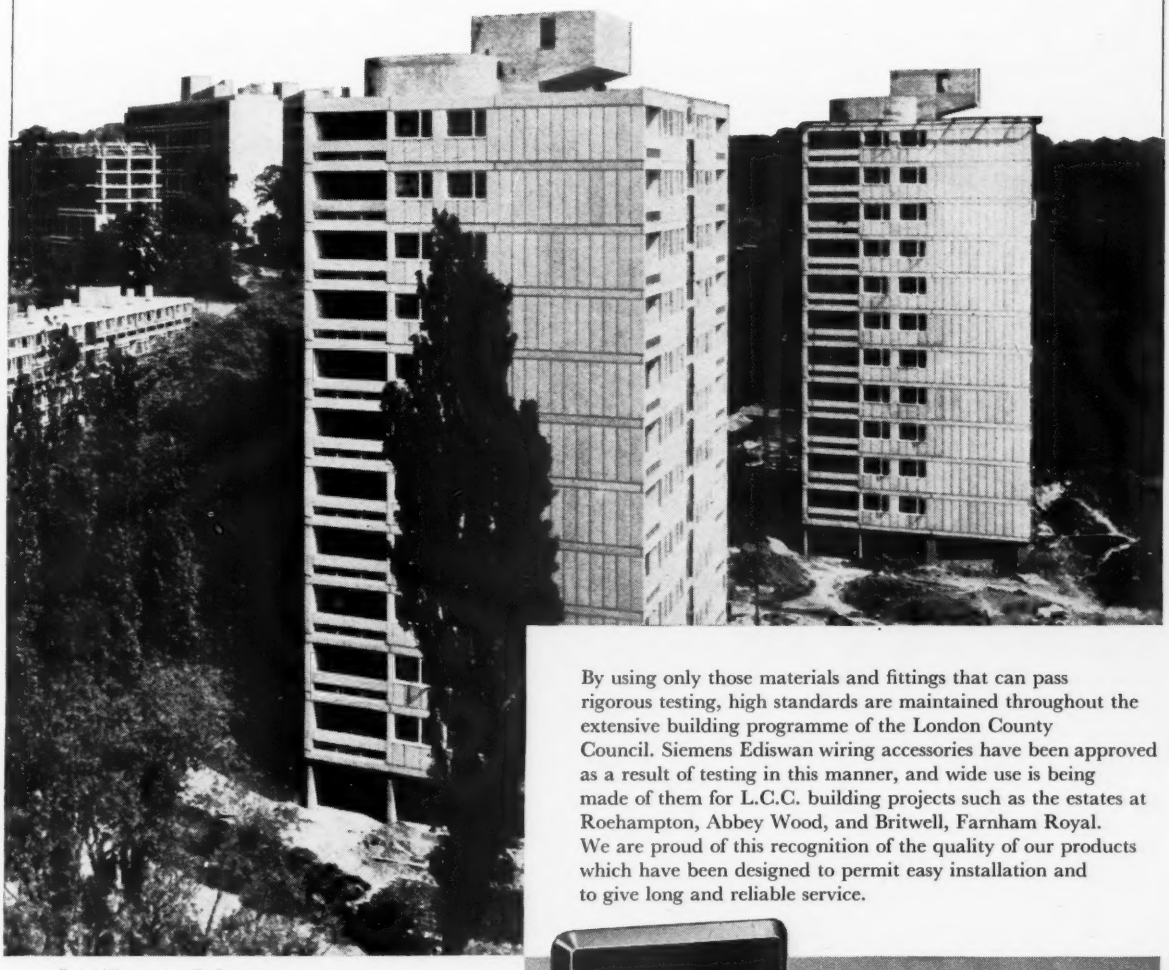
Leamington Spa Highways and Planning Committee has approved a scheme, estimated to cost £2,750, for the installation of Class "A" fluorescent lanterns on concrete columns in a section of Old Warwick Road.

Manchester Corporation Highways Committee has decided to limit future purchases of mercury vapour lamps for illuminating the city centre to the colour-corrected type to enable standardisation to be achieved.

Newcastle-on-Tyne City Council has received sanction to borrow £60,175 for converting street lighting from gas to electricity.

Old Fletton (Hunts) U.D.C. is to spend £6,200 on improving and extending the street lighting in the area.

High standards...



Part of the estate at Roehampton.

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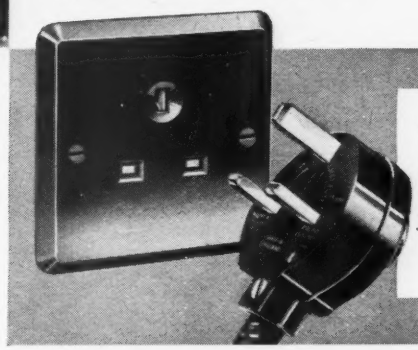
ENGINEERING SERVICES: Joseph Rawlinson, C.B.E., M.ENG., M.I.C.E., M.I.MECH.E., Chief Engineer to the L.C.C.

BUILDERS: Wates Ltd., London S.W.16
Tersons Limited, London N.3

ELECTRICAL CONTRACTORS:
Electric Contracts (London) Ltd., London S.W.1
A. & V. Baxter Ltd., Croydon, Surrey

By using only those materials and fittings that can pass rigorous testing, high standards are maintained throughout the extensive building programme of the London County Council. Siemens Ediswan wiring accessories have been approved as a result of testing in this manner, and wide use is being made of them for L.C.C. building projects such as the estates at Roehampton, Abbey Wood, and Britwell, Farnham Royal. We are proud of this recognition of the quality of our products which have been designed to permit easy installation and to give long and reliable service.



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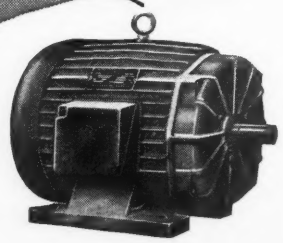
TOTALLY ENCLOSED



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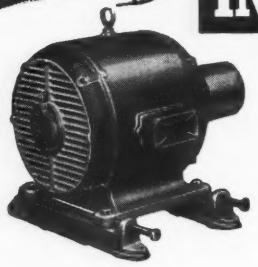

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226 HIGH STREET, CROYDON — *Telephone:* **Croydon 7984**

23-25 GREEN LANE, ILFORD — *Telephone:* **Ilford 1051, 4319**

9 STATION PARADE, BALHAM. *Telephone:* **Balham 5152**

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NEXT WEEK'S EVENTS

Organisers of electrical functions are advised to make use of the "Electrical Review" clearing house, Room 221, Dorset House, Stamford Street, London, S.E.1, to ascertain that proposed dates for their functions do not clash with others already arranged.

Monday, 2nd December

BIRMINGHAM.—James Watt Institute, Great Charles Street, 6 p.m. I.E.E. South Midland Centre. "Electronic Control of Machine Tools," by D. T. N. Williamson. (Joint meeting with the Radio and Measurements Group, the Supply and Utilisation Group and the I.P.O.E.E. Birmingham Centre.)

ILFORD.—Angel Hotel, 8 p.m. A.S.E.E. North East London Branch. "Flameproof Installations," by S. J. Emerson.

IPSWICH.—Crown and Anchor Hotel, 6 for 6.30 p.m. I.E.E. East Anglian Sub-Centre. "Arc Suppression Coil Operation," by L. B. S. Golds.

LEEDS.—Great Northern Hotel, 7.30 p.m. A.S.E.E. Leeds Branch. "The Electronic Control of Variable Speed Drives," by R. H. Stannard.

LONDON.—At the I.E.E., Savoy Place, W.C.2, 5 p.m. Institution of Post Office Electrical Engineers. "Junction Transistors and their Application to Switching Circuits," by R. V. Leedham.

Caxton Hall, S.W.1, 7 p.m. E.P.E.A. London Technical Group. "Developments in Railway Electrification," by J. A. Broughall.

MAIDSTONE.—Maidstone Technical College, Tonbridge Road, 6.30 for 7 p.m. I.E.E. district meeting. "Some Medical Uses of Radio-Active Isotopes," by Dr. E. H. Belcher.

NEWCASTLE-UPON-TYNE. — King's College, 6.15 p.m. I.E.E. North-Eastern Radio and Measurements Group. "Recent Uses of Ultrasonics in Investigating the Characteristics of Materials," by Dr. J. Lamb.

County Hotel, Neville Street, 6.30 p.m. North East Electrical Club. "Power Factor Improvement by Capacitors—A General Survey," by F. Moores.

SHEFFIELD.—Royal Victoria Station Hotel, 7.30 p.m. A.S.E.E. Sheffield Branch. "Normal Frequency Electric Furnaces," by B. Evans.

Monday, 2nd December, to Friday, 6th December

LONDON.—Earls Court. Smithfield Show and Agricultural Machinery Exhibition.

Tuesday, 3rd December

CAMBRIDGE.—Cavendish Laboratory, Free School Lane, Cambridge, 8 p.m. I.E.E. Cambridge Radio and Telecommunication Group. "The Mullard Radio Astronomy Observatory," by M. Ryle.

EDINBURGH.—Carlton Hotel, North Bridge, 7 p.m. I.E.E. South-East Scotland Sub-Centre. The Forty-Eighth Kelvin Lecture on "Infra-Red Radiation," by Dr. G. B. B. M. Sutherland.

LEEDS.—C.E.A., Yorkshire Division, 1, Whitehall Road, 6.30 p.m. I.E.E. North Midland Centre. Informal evening. "The Use of Transistors in Radio and Television," talks by Dr. A. J. Biggs and E. Wolfendale.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Measurement and Radio Sections. "Some Aspects of Half-Wave Magnetic Amplifiers," by G. M. Ettinger. "Some Transistor Input Stages for High-Gain D.C. Amplifiers," and "A Transistor High-Gain Chopper Type D.C. Amplifier," by Dr. G. B. B. Chaplin and A. R. Owens. "Dekatrons and Electro-Mechanical Registers operated by Transistors," by Dr. G. B. B. Chaplin and R. Williamson.

I.E.E. London Graduate and Student Section, 6 p.m. Visit to Post Office Underground Railway, Mount Pleasant, E.C.1.

Holophane Showrooms, 7.30 p.m. A.S.E.E. West London Branch. "Flameproof Lighting Equipment and Its Application," by S. E. Harris.

At the Royal Society of Arts, John Adam Street, Adelphi, Strand, W.C.2, 7 p.m. Incorporated Plant Engineers. "The Impact of Automation on the Plant Engineer," by J. F. Coales.

MANCHESTER. — Engineers' Club, Albert Square, 6.15 p.m. I.E.E. North-Western Centre. "Cathodic Protection," by L. B. Hobgen, K. A. Spencer and P. W. Heselgrave.

READING.—The University, London Road, 7.15 p.m. A.S.E.E. Oxford, Reading and Districts Branch. "Nuclear Reactors."

STOKE-ON-TRENT.—North Stafford Hotel, 6 p.m. I.E.S. Stoke-on-Trent Group. "The Lighting of Small Factories," by J. S. McCulloch.

Wednesday, 4th December, to Friday, 6th December

LONDON. — Olympia. National Poultry Show.

Wednesday, 4th December

BIRMINGHAM.—James Watt Memorial Institute, Great Charles Street, 7 p.m. Junior Institution of Engineers, Midland Section. Presidential address, by Dr. R. Morcom.

BRISTOL.—Bristol University, 7.15 p.m. Institute of Production Engineers, Western Section. "The Emergence of Automation as an Evolutionary Process," by J. A. Sargrove.

CARDIFF. — College of Technology and Commerce, Cathays Park, 6.30 p.m. British Institution of Radio Engineers, South Wales Section. "Demonstration on Aerial Circuits," by H. V. Sims.

EDINBURGH.—Y.M.C.A. Social Room, 14, South Saint Andrew Street, 6.15 p.m. I.E.S. Edinburgh Centre. "Acrylic Plastics in Modern Interior Lighting," by P. H. Collins.

GLASGOW.—39, Elmbank Crescent, 7 p.m. I.E.E. South-West Scotland Sub-Centre. "Electrical Floor Warming," by J. W. Moule and W. M. Stevenson.

HALIFAX.—White Swan Hotel, 7.30 p.m. Institute of Production Engineers, Halifax and Huddersfield Section. "Increased Automation of Existing Production Lines," by J. B. Jay.

HARRINGAY.—"Queen's Head," 677, Green Lanes, N.4, 7.45 p.m. A.S.E.E. North London Branch. "Electrical Water Treatment," by A. G. Freeborn.

HOVE.—At the S.E.E.B., 6.30 p.m. I.E.E. Southern Centre. "Mechanical Strength of Power Transformers in Service," by E. T. Norris.

LEICESTER.—Bell Hotel, 7 p.m. Incorporated Plant Engineers, Leicester Branch. "The Research, Information and Training Activities of P.E.R.A.", by D. D. Morgan.

LONDON.—Savoy Place, W.C.2, 6.30 p.m. I.E.E. London Graduate and Student Section. Students' Lecture, "Man/Machine Relationships," by W. H. Dunkley.

St. Ermin's Hotel, Westminster, S.W.1, 10.30 a.m. Combustion Engineering Association, Southern Region Meeting. "The Effectiveness of Instrumentation for Combustion and Process Work," by R. Clare. 2.30 p.m., "Nuclear Power Reactors," by W. R. Wootton.

Church House, Great Smith Street, S.W.1, 10.30 a.m. Inaugural meeting of the Powder Metallurgical Group of the Institute of Metals and the Iron and Steel Institute.

MANCHESTER.—Carlton Restaurant, 7 p.m. A.S.E.E. Manchester Branch. Chairman's night and hot pot supper.

NEWCASTLE-UPON-TYNE. — King's College, College Road, 6.15 p.m. I.E.S. Newcastle-upon-Tyne Centre. "The Lighting of London Airport," by J. G. Holmes.

SHEFFIELD.—City Hall, 7.30 p.m. I.E.E. Sheffield Sub-Centre. Faraday Lecture, "The Electrification of the British Railways," by G. H. Fletcher.

SOUTHAMPTON.—Polygon Hotel, 7.30 p.m. Incorporated Plant Engineers, Southern Branch. "Photography in Engineering."

SUTTON COLDFIELD.—Town Hall. I.E.E. South Midland Graduate and Student Section. Annual joint dance.

SWANSEA.—South Wales Electricity Board, The Kingsway, 6.30 p.m. I.E.S. Swansea Group. "Road Vehicle Lighting," by K. J. Jones.

Thursday, 5th December

BIRMINGHAM. — Chamber of Commerce, New Street, 7.30 p.m. A.S.E.E. Birmingham Branch. Haldane Regional Lecture, "Railway Electrification and Modernisation," by J. A. Broughall.

CARDIFF.—South Wales Electricity Board, The Hayes, 6 p.m. I.E.S. Cardiff Centre. "Road Vehicle Lighting," by K. J. Jones.

CHELMSFORD.—Crompton's Social Hall, 7.30 p.m. Chelmsford Engineering Society. "Progress in Electricity Supply," by C. T. Melling.

GLASGOW.—At the Lighting Service Bureau of Scotland, 29, St. Vincent Place, 6.30 p.m. I.E.S. Glasgow Centre. "Acrylic Plastics in Modern Interior Lighting," by P. H. Collins. (Joint meeting with A.S.E.E.)

HULL.—Y.E.B., Ferensway, 6.30 p.m. I.E.E. North Midland Centre. "Project Considerations for Diesel Electric Traction," by R. S. Wignall. (Joint meeting with the Graduate and Student Section.)

LONDON.—Savoy Place, W.C.2, 5.30 p.m. Institution of Electrical Engineers. Ordinary meeting (in conjunction with the British Nuclear Energy Conference). Lecture on "Advanced Types of Power Reactors," by Dr. J. V. Dunworth.

C.E.A. Headquarters, Winsley Street, W.1, 6.45 p.m. Women's Engineering Society, London Branch. "The Radio Telescope."

NOTTINGHAM. — E.M.E.B., Smithy Row, 6 p.m. I.E.S. Nottingham Centre. "A Feminine Viewpoint on Domestic Lighting," by Mrs. K. Hudson.

PLYMOUTH.—Electricity Showrooms, New George Street, 3 p.m. I.E.E. South-Western Sub-Centre. "The B.B.C. Sound Broadcasting Service on Very-High Frequencies," by E. W. Hayes and H. Page.

SHEFFIELD. — Grand Hotel, Incorporated Plant Engineers, Sheffield and District Branch. Annual dinner and dance.

SOUTHAMPTON.—Polygon Hotel, 8 p.m. A.S.E.E. Southampton Branch. "Closed Circuit Television and Future Developments," by P. S. Carnt.

Friday, 6th December

BIRMINGHAM.—Town Hall. I.E.E. South Midland Centre. Faraday Lecture on "The Electrification of the British Railways," by G. H. Fletcher.

BRISTOL. — Grand Hotel, Broad Street, 8 p.m. A.S.E.E. Bristol and West of England Branch. "Earth Leakage Protection," by J. A. Robbins.

CARDIFF.—Angel Hotel, Westgate Street, 7 p.m. A.S.E.E. South Wales Branch. Annual dinner.

CARLISLE. — Technical College, 7 p.m. I.E.E. North-Eastern Centre. District meeting. "Electricity in Modern Commercial Horticulture," by C. A. Cameron Brown and A. W. Gray.

CREWE.—Crewe Arms Hotel, 7.30 p.m. A.S.E.E. Stoke and Crewe Branch. "Modern Railway Signalling," by F. W. Young.

LIVERPOOL.—9, The Temple, 24, Dale Street, 7.30 p.m. A.S.E.E. Liverpool and District Branch. Discussion on the 13th Edition I.E.E. Regulations.

LONDON.—Oxford Street Corner House, W.1, 7 for 7.30 p.m. Institute of Metal Finishing. Annual dinner and dance.

NEWCASTLE-UPON-TYNE. — Eldon Grill, Grey Street, 7.30 p.m. I.E.E. North Eastern Graduate and Student Section. Section smoker.

Saturday, 7th December

LONDON.—Park Lane Hotel, Piccadilly, W., 6 for 6.30 p.m. Association of Supervising Electrical Engineers. Ladies' night.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses

Australia.—Postmaster General's Department, Melbourne. 17th December. Electron tubes. (E.S.B. 26641/57. Ten/29364.)*

Belfast.—16th December. Electrical installation in St. Joseph's Training College, Trench House, Andersonstown. C. P. MacNally, 143, Royal Avenue, Belfast.

Burma.—Burma Purchase Board, Rangoon. 5th December. "Megger" insulation testers, voltmeters, and cell and coil testers. (E.S.B. 28083/57. Ten/29358.)*

Canada.—Manitoba Hydro-Electric Board, Winnipeg. 17th December. Coal handling plant for Selkirk generating station. (E.S.B. 27244/57. Ten/29378.)*

Ceylon. — Ceylon Transport Board, Colombo. 4th December. Battery servicing equipment. (E.S.B. 27782/57. Ten/29288.)*

Chertsey.—U.D.C. 9th December. 270 lighting units to group "B" standard, including fittings, for street lighting conversion scheme. Engineer and surveyor, Council Offices, Guildford Street.

Costa Rica.—Instituto Costarricense de Electricidad, San Jose. 10th December. Aluminium conductor cable, telephone wire and accessories. (E.S.B. 27807/57. Ten/29292.)*

Down.—County Education Committee. 11th December. Electrical installations in Killyleagh Technical School and Killyleagh Health Clinic. J. R. W. Murland, consulting engineer, 13, Wellington Place, Belfast.

Godstone.—R.D.C. 6th December. Electrical work in flats and houses. (See this issue.)

Greece. — State Procurement Service, Athens. 5th December. Three selenium rectifiers. (E.S.B. 28201/57. Ten/29356.)*

India.—Hindustan Steel Private, Ltd., Rourkela. 20th December. Electric push-button signal box and intercommunication systems. (E.S.B. 27090/57. Ten/29313.)*

Ipswich.—Corporation. 16th December. Trunk road lighting. (See this issue.)

Iran. — Army Armament Department, Teheran. 16th December. Electrical materials, including switches, cables, lamps, insulating tape and boards, distributing cases. (E.S.B. 27282/57. Ten/29384.)*

Liverpool.—City Council. 14th December. Six pedestrian-controlled electric trucks for collection of street sweepings. City engineer and surveyor, Municipal Buildings, Dale Street, 2.

New Zealand.—G.P.O., Wellington. 13th December. Paper insulated telephone cable. (E.S.B. 27538/57. Ten/29220.)* 17th December. Magnetic tape recorders and microphones. (E.S.B. 27693/57. Ten/29275.)* 15th January. Meters. (E.S.B. 27539/57. Ten/29242.)*

Pakistan.—Posts and Telegraphs Department, Karachi. 11th December. Armoured cable. (E.S.B. 27838/57. Ten/29340.)*

Philippines.—National Power Corporation, Manila. 3rd February. Transmission line conductors, insulators, line hardware and accessories. (E.S.B. 27937/57. Ten/29332.)*

Rhodesia and Nyasaland.—Federal Tender Board, Causeway. 6th December. Five sets of radio transmitter/receivers. (E.S.B. 27873/57. Ten/29363.)*

South Africa.—City of Johannesburg. 5th December. Traffic signal head assemblies. (E.S.B. 27398/57. Ten/29321.)* 9th December. Poles for traffic signal heads. (E.S.B. 28032/57. Ten/29371.)*

Union Tender and Supplies Board, Pretoria. 12th December. X-ray equipment. (E.S.B. 27762/57. Ten/29308.)* 19th December. Cadmium copper line wire. (E.S.B. 28017/57. Ten/29350.)* Flameproof cross-connecting wire. (E.S.B. 28016/57. Ten/29373.)*

Stores Department, South African Railways. 20th December. H.v. switchboards. (E.S.B. 27676/57. Ten/29380.)* Twenty-seven transformers, ranging from 5 kVA to 200 kVA. (E.S.B. 28039/57. Ten/29349.)*

Southampton.—Corporation. 9th January. Private automatic telephone system for Civic Centre. (See this issue.)

United States.—Bureau of Reclamation, Denver. 6th December. Three potential transformers and three current transformers. (E.S.B. 27740/57. Ten/29401.)* Two power circuit-breakers. (E.S.B. 28116/57. Ten/29405.)* 19th December. One 8,000 kVA power transformer. (E.S.B. 27296/57. Ten/29283.)*

Wandsworth.—Borough Council. 13th December. Electric lamps and electrical work for three years from 1st April, 1958. Borough engineer, Municipal Buildings, Wandsworth, London, S.W.18.

Welwyn Garden City.—U.D.C. 18th December. Remote control cable for water scheme. (See this issue.)

ORDERS PLACED

Bournemouth.—Highways and Works Committee. Street lighting installations in various roads (£6,514).—Revo Electric Co.

Glasgow.—Corporation Cleansing Committee. Electrical installation at repair workshop, greasing block and washbays, Refuse Disposal Works, Polmadie (£10,046).—Archibald Watson & Dundas.

Sheffield.—Transport Committee. Installation of electrical services at Greenland Road Garage (£14,194).—Volt Works Co.

Housing Committee. Electrical installations in 216 maisonnettes and flats, Gleadless Valley estate (£13,286).—Holliday, Hall & Stinson. Recommended. Installation of 13 electric passenger lifts and three electric goods lifts in multi-storey flats, Park Hill (£47,868).—Express Lift Co.

WORK IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors

Billingham-on-Tees.—Maternity and child welfare centre, school clinic and library for Durham C.C.; P. R. Middleton & Partner, architects, 17, Albert Road, Middlesbrough.

Bishop's Stortford.—Extensions to Herts and Essex High School (£50,000); C. H. Aslin, county architect, County Hall, Hertford.

Burnham (Bucks). — Grammar school; county architect, County Offices, Walton Street, Aylesbury.

Consett.—Old people's hostel (£38,000); R. C. Williamson, Ltd., builders, Station Works, Rowlands Gill, Co. Durham.

Crowthorne.—Secondary school; Richard Sheppard & Partners, architects, 14, Princes Gardens, London, S.W.7.

Durham.—Fire station, Durham City; county architect, South Street, Durham.

East Sussex.—Secondary school, Wadhurst (£98,736), primary school, Woodlands Avenue, Hove (£42,350), completion of Haywards Heath Grammar School (£70,000), and assembly hall at Lewes County Grammar School (£19,000); J. Catchpole, county architect, County Hall, Lewes.

Egham.—Houses (36), Ripley Springs estate; U.D.C. surveyor, Fire Station Buildings, High Street, Egham, Surrey.

Forest Hall.—Extensions to Percy Hedley School for Spastic Children (£70,000); R. Bowey & Son, Great North Road, Newcastle-on-Tyne.

Gateshead.—Alterations and extensions to General Hospital (£20,000); Spence & Price, St. Mary's Place, Newcastle-on-Tyne.

Glasgow.—Houses (368), Langlands Road site; Scottish Special Housing Association, Ltd., 15/21, Palmerston Place, Edinburgh, 12.

Gosforth.—Junior school (£100,000); T. Curry & Sons, Meldon Street, Newcastle-on-Tyne.

Harlow.—Court House; Fredk. Gibberd, architect, 19, The Rows, Stone Cross.

Factory, industrial area; W. & C. French, Ltd., builders, Epping New Road, Buckhurst Hill.

Loughborough.—Dwellings (67), Victoria Street; Gregory Housing, Ltd.

Manchester.—Factory, Shentonfield Road, Northenden; Chas. Hurst (Toolmakers), Ltd., 11, Ladybarn Road.

Newton Abbot.—Factory, industrial estate; Pollards, ice cream manufacturers, 112, Queen Street.

Northants.—Police station and court house at Daventry and fire stations at Towcester and Woodford Halse; J. Alan Turner, clerk, County Hall, Northampton.

Northumberland.—Fire station, Belford (£13,000); J. Sample & Son, builders, Amble.

Fire station at Seahouses (£12,000); R. Carse & Son, builders, Prospect Road, Amble.

Nottingham.—Houses and flats (375), Bestwood Park estate; A. L. Hughes, Ltd., 102, Baggrave Street, Leicester.

Oldbury. — Houses (64), Queensway; borough surveyor, Birmingham Road.

Old Hill.—Office block extension for Delingpole & Co., Ltd., Retford Street; J. M. Tate & Sons, Ltd., builders, Cradley, Staffs.

Oxford.—Law library, Manor Road (£290,000) for University Chest; clerk of works, Old Town Cottage, Nuneham Park.

Oxshott (Surrey).—Houses (65), Littleheath Farm estate; U.D.C. surveyor, High Street, Esher, Surrey.

Ponteland.—Extensions to Kirkley Hall Agricultural School (£73,350); county architect, County Hall, Newcastle.

Reading.—Houses (77), Bath Road; James T. Cook & Son, Ltd., 74/6, London Street.

Factory, Commercial Road; Church & Co. (Fittings), Ltd., Oracle House, Minster Street.

Rossington.—"Derwent" type infants' school for 240 children; Don Valley Education Department, Doncaster.

Runcorn.—Houses (50), Ship Street, Frodsham; R.D.C. surveyor, Castle Park, via Frodsham.

Stockport.—Civic building at rear of Town Hall, comprising clinics and office accommodation; borough architect, Town Hall.

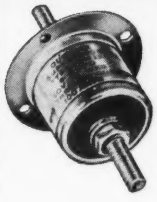
Sunderland.—Abattoir and cold stores (£230,000); borough architect.

Wakefield.—Offices, Charlesworth Lane; James Miller & Partners, Ltd., New Millerdam.

Flats (40), Clarion Street; Harlow & Milner, Ltd., builders, 33, Warrengate.

Willesden.—Shops, showrooms, staff rooms and offices in three-storey building; Unicos Property Corporation, Ltd., 43, North Audley Street, London, W.1.

* Specifications may be inspected at the Export Services Branch, Board of Trade, Lacon House, Theobald's Road, London, W.C.1 (Chancery 4411; extension 769).



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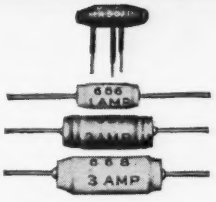

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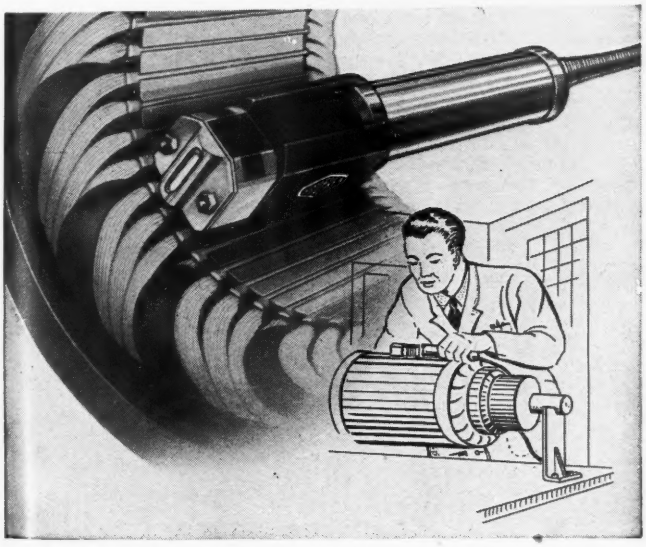

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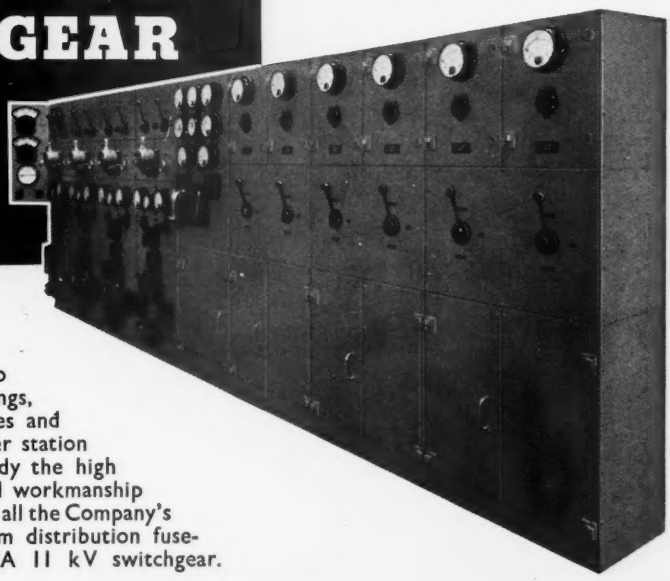

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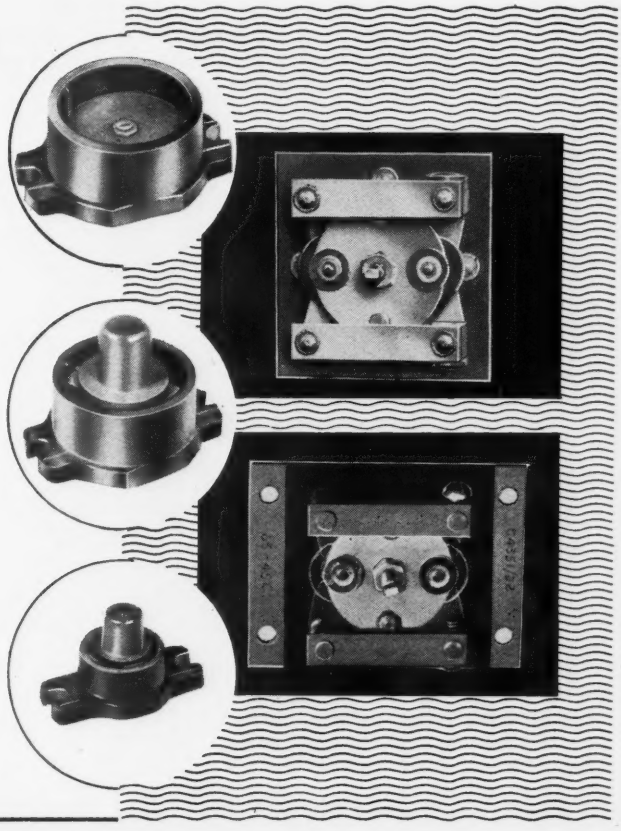

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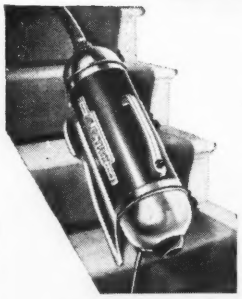

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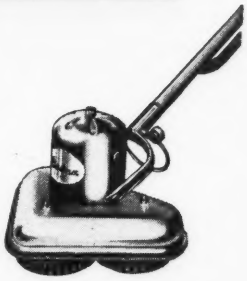

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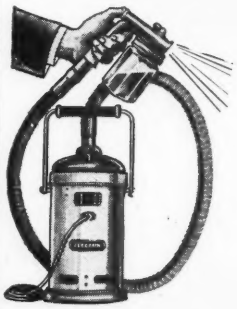

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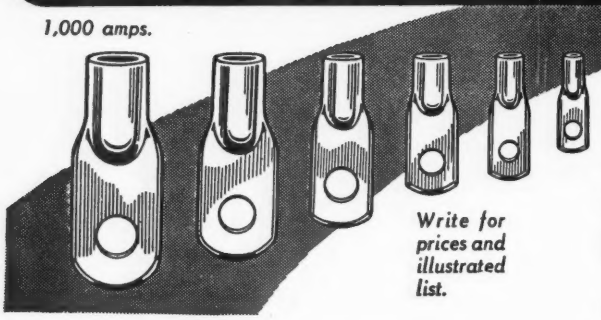

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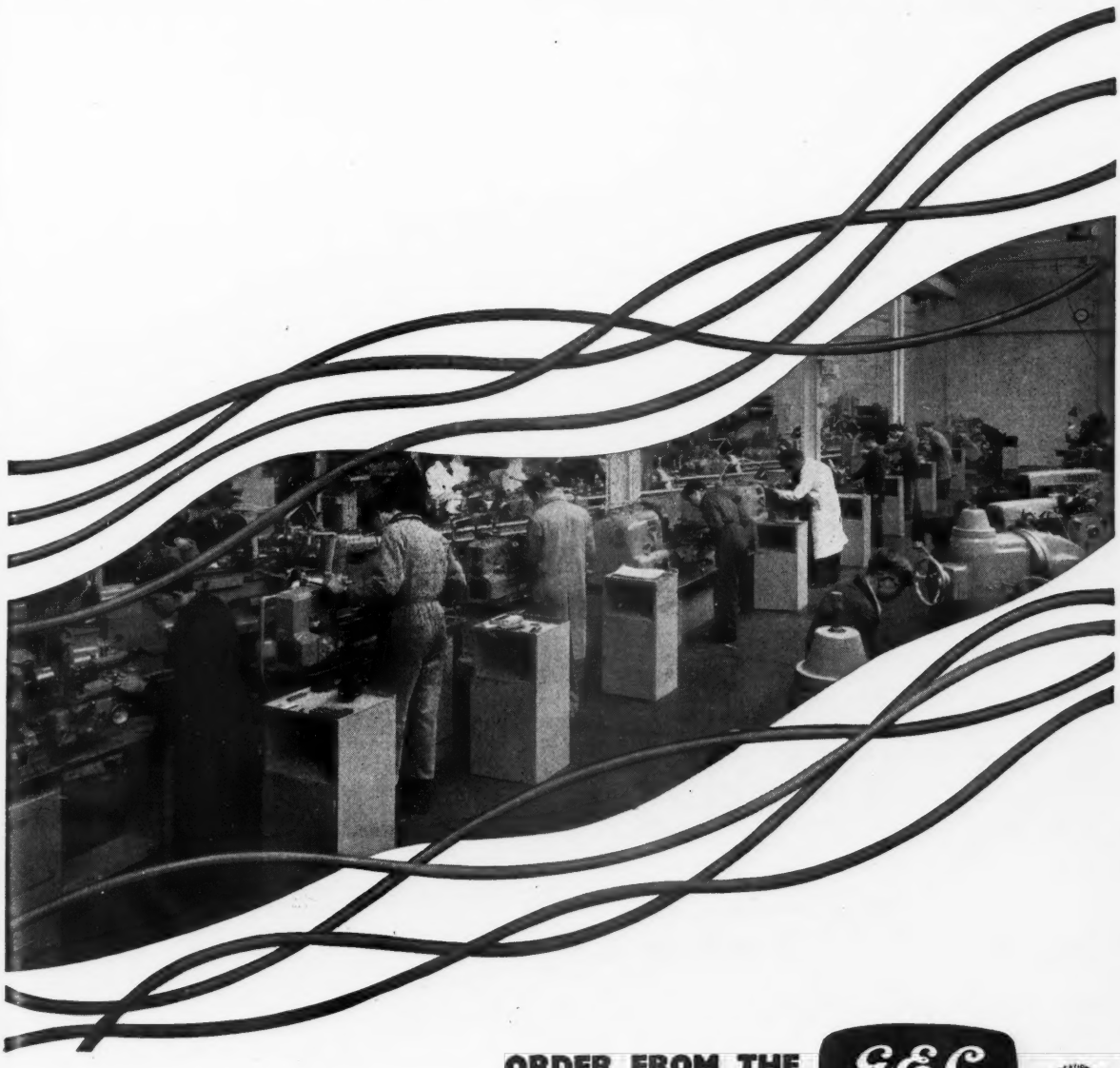

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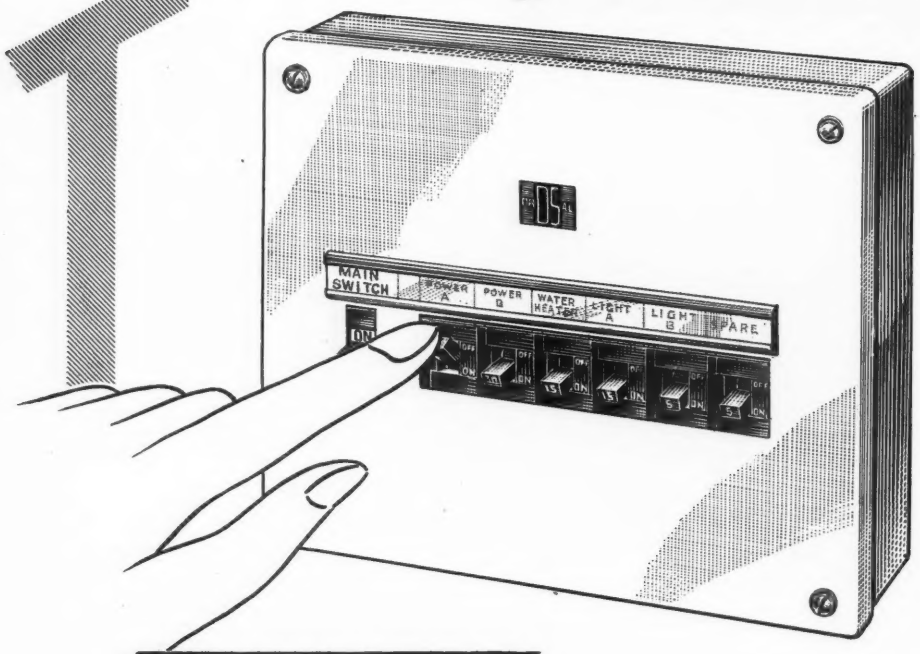

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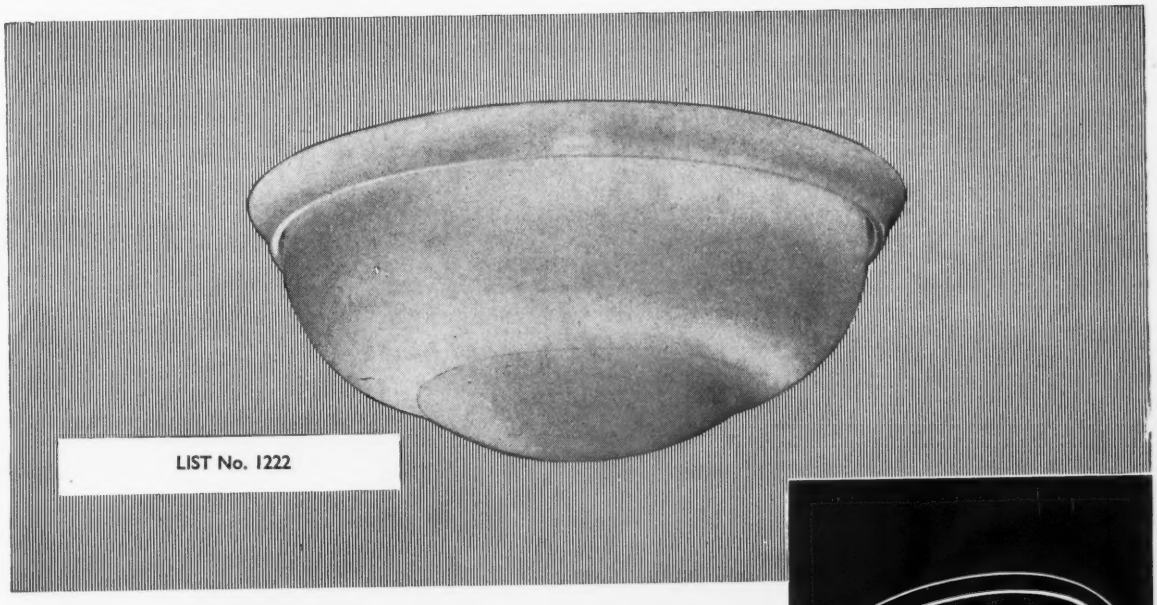

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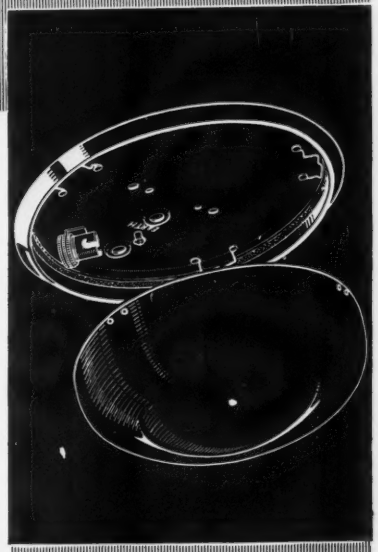

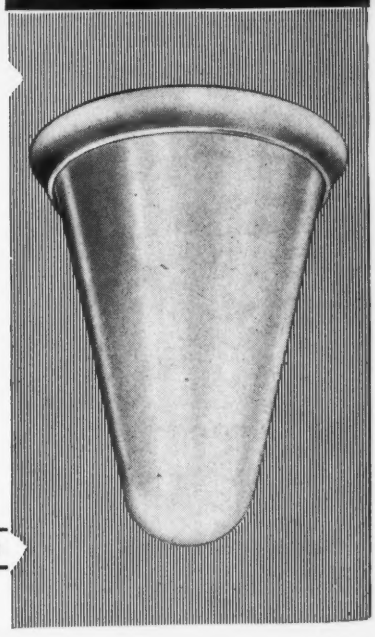

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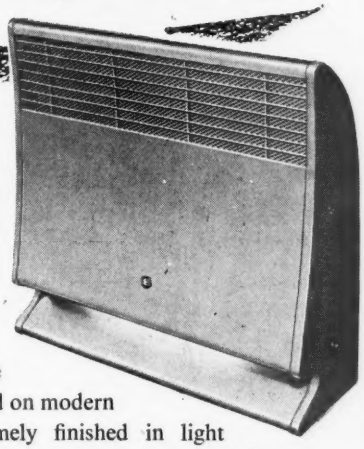

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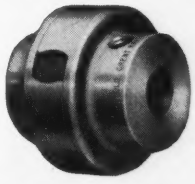

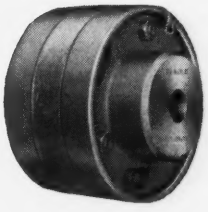

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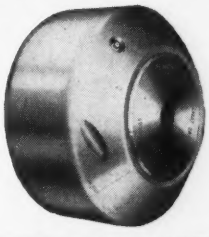

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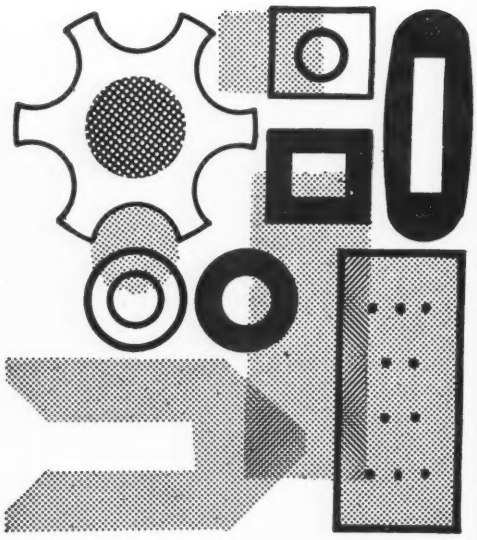

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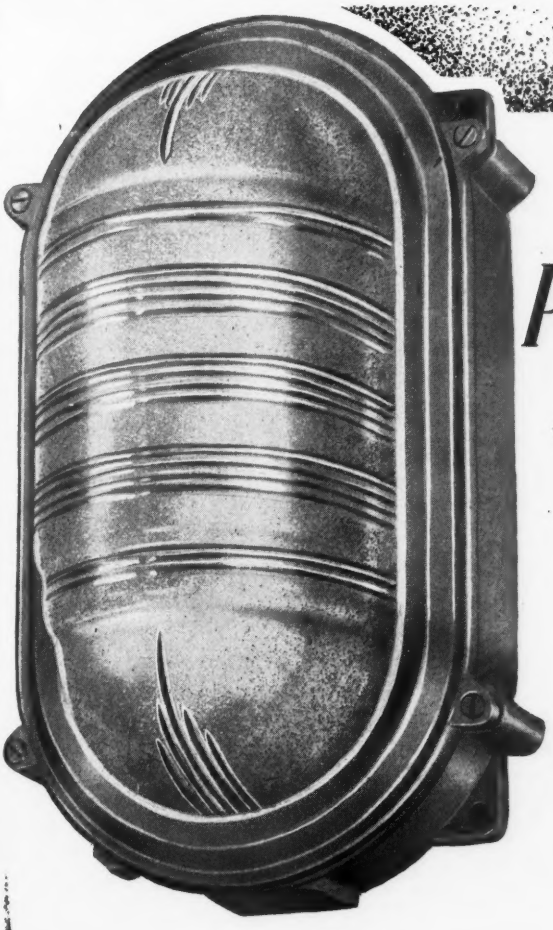

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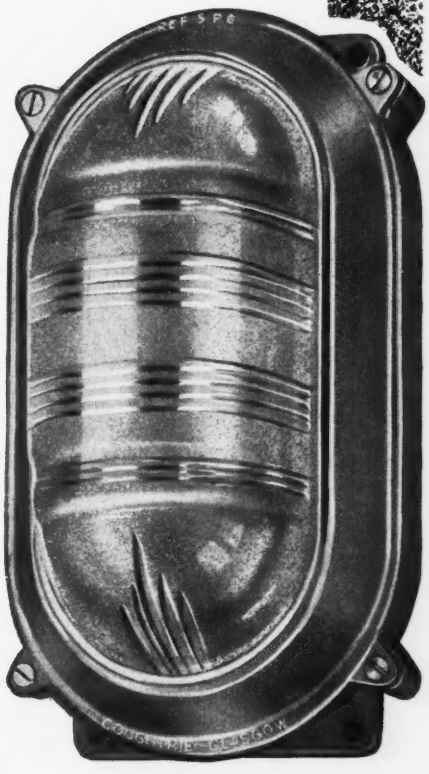

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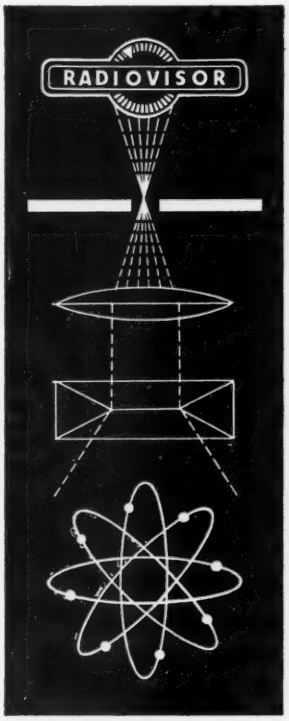

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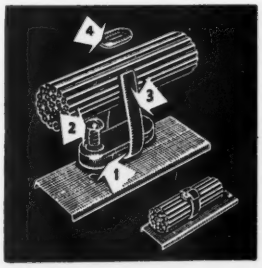

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3 A length of BETA strip
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- Will accommodate any number of cables
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- IT WILL NOT STRETCH IN USE
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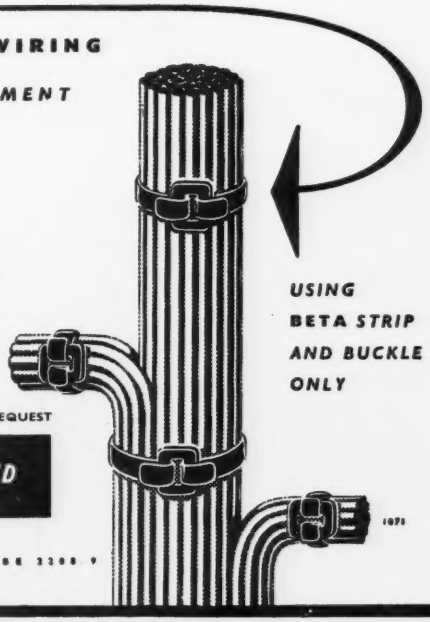

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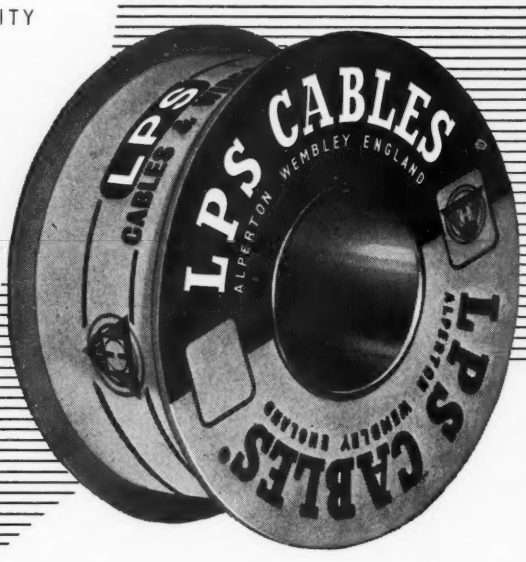

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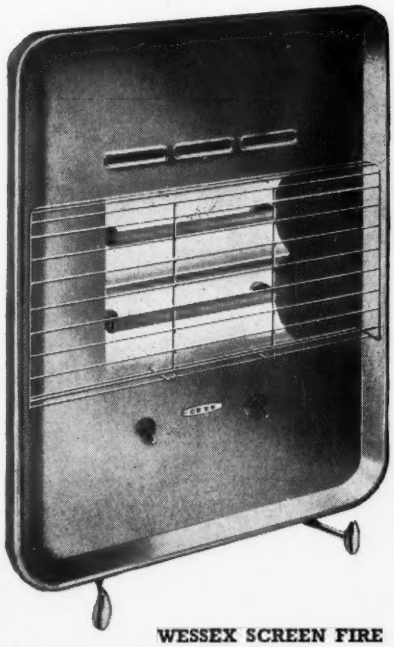
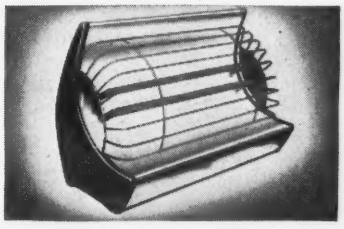
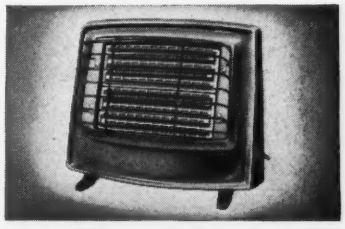


WESSEX SCREEN FIRE

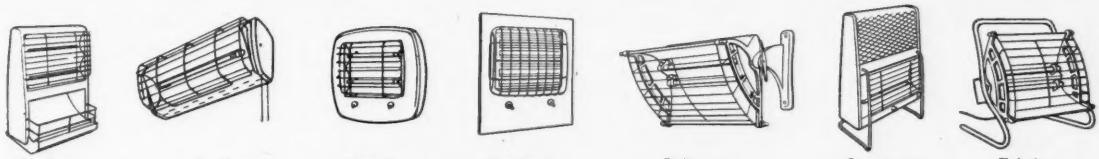
An exciting example of the best in contemporary design. Functional too, because it completely screens the opening of an ordinary fireplace. Made in 2 sizes with adjustable feet and 2 k.w. pencil elements. Colours: Welsh Grey, Cotswold Stone, Pale Gold, Gay Red.



CRESCENT. Delightfully shaped model in enamelled sheet steel with electro-brightened anodised reflector, plated guard and pencil type elements 1 kw. or 2 kw. Colours: Welsh Grey, Cotswold Stone, Pale Gold, Gay Red.



SOMERSET. A fire with superb finish and sound construction. Gleaming vitreous enamel finish with plated guard and block type elements. 1 k.w. or 2 k.w. Colours: Oyster Grey, Guardsman Red, Citron Yellow, Willow Green.



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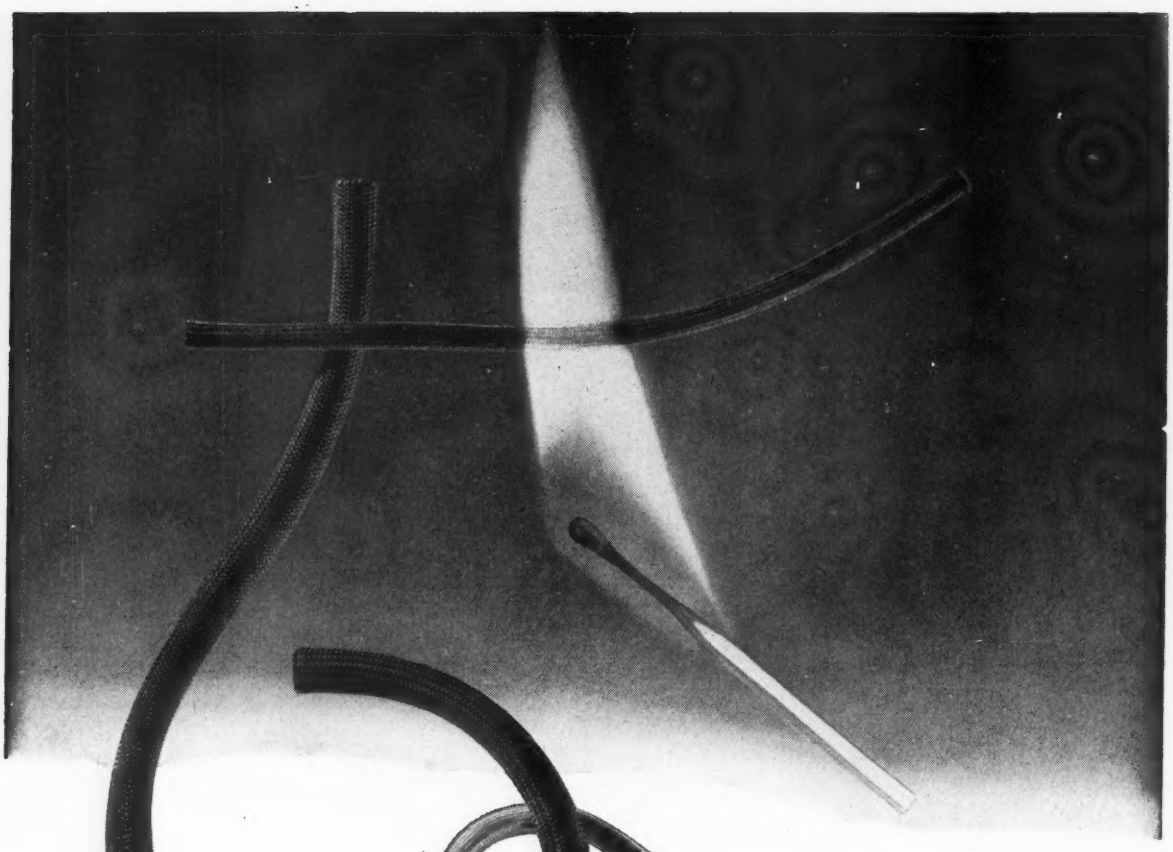

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sleevings, called **Vidaflex** (Trade Mark), are made by Jones, Stroud & Company Limited. The sleevings, which are non-fraying, can be supplied unimpregnated or impregnated with silicone or other varnishes of high dielectric strength. They come in a range of sizes from 0·5 mm to 30 mm diameter and in continuous or 1 yard lengths. Braided from 'E-glass' yarn, Vidaflex sleevings are heat-resisting, rot-proof and unaffected by climatic conditions — because they are . . .

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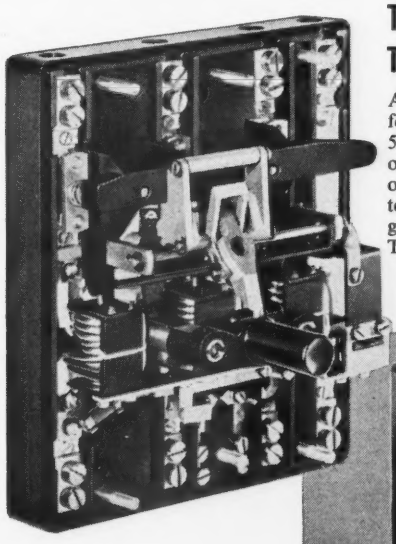
Pamphlet No. ST.2 gives details of Siemens Ediswan Monitored Earth Leakage Circuit Breaker Units for automatic switching off should the earth wires become disconnected or fractured.



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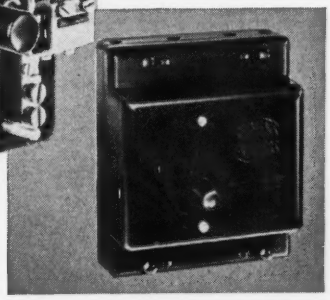

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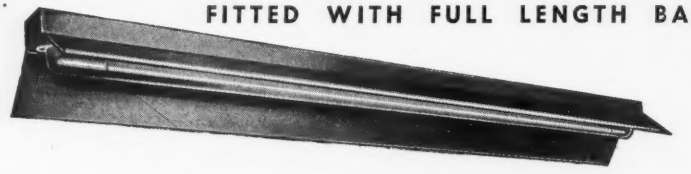

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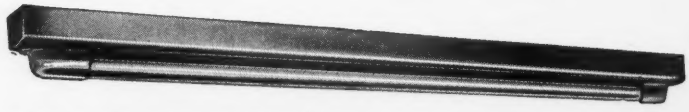

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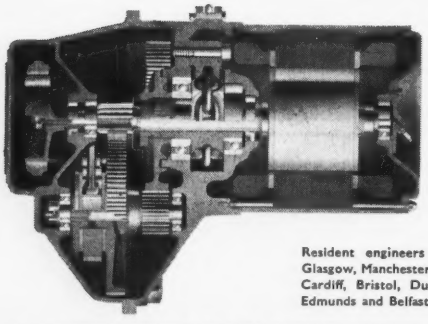

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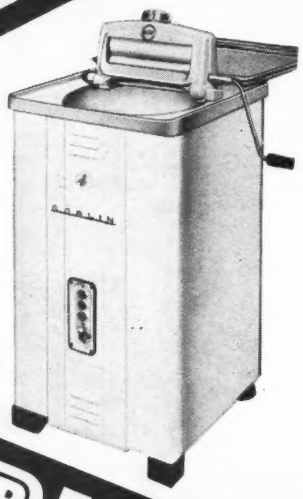

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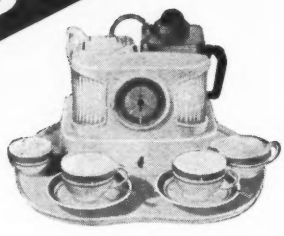

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School Keeper servicing fittings at 20 feet

Photo by courtesy London County Council

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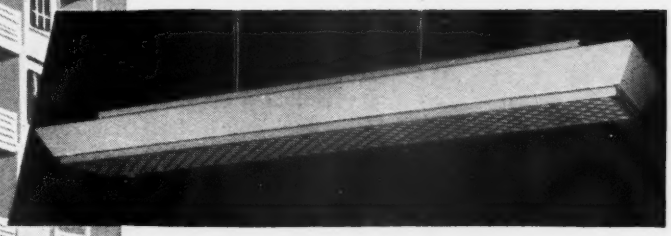
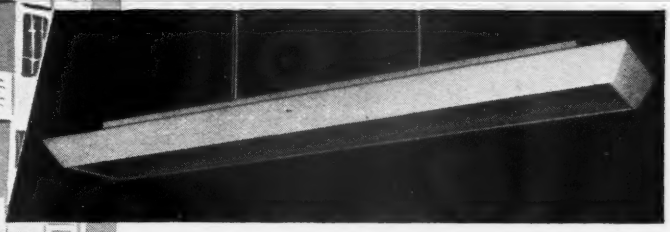
FLEET—Gear channel, body and louvre of sheet steel, stove enamelled off-white. The louvre is specially designed to show only the transverse members and has "perspex" shields at each end to conceal the lamp holders.



WANDLE—Gear channel and body of sheet steel, stove enamelled off-white. The louvre is of polystyrene.



EMBER—Gear channel and body of sheet steel, stove enamelled off-white. The lower panel is of $\frac{1}{4}$" reeded clear "perspex".

The "THAMES" range of decorative fittings for fluorescent lamps has been designed to provide a range of 30 fittings from a small number of basic parts. Comprising five simple designs with six lamping possibilities in each; 2, 3 or 4 Lamps in 5 ft 80 watt or 4 ft 40 watt sizes. It will provide a fitting to suit the requirements of every interior from the point of view of both appearance and luminous output.

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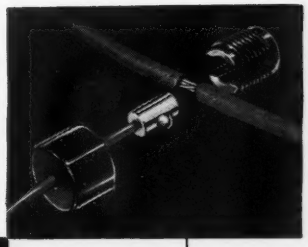
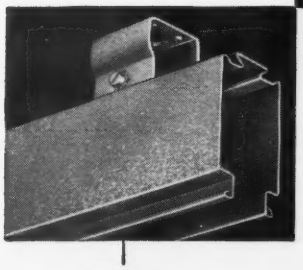
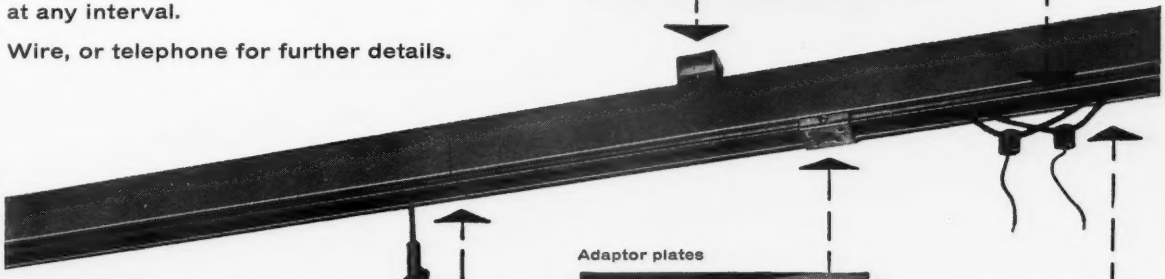


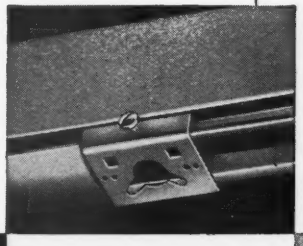
Line tap 'take-off'

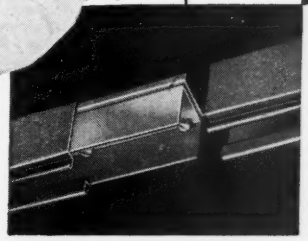


Channel section and suspension stirrup

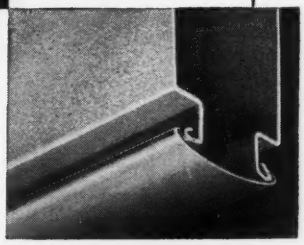


Adaptor plates





Internal coupling



Plastic cover strip

ELECTRICAL EQUIPMENT

Crompton Parkinson LIMITED

BY APPOINTMENT TO HER MAJESTY THE QUEEN MANUFACTURERS OF ELECTRIC LAMPS

CROMPTON PARKINSON LIMITED, CROMPTON HOUSE, ALDWYCH, LONDON, W.C.2.
Telephone: CHAncery 3333. Telegrams: Crompark Estrand London

BOLTON'S

BARE H.C. COPPER AND COPPER ALLOY WIRE PRODUCTS

THOMAS BOLTON & SONS LTD

Soft Copper Wire For power transmission overhead and underground and for telephone cables and multiple circuit transmission where physical and electrical properties and tolerances are usually to exacting specifications.

Cadmium Copper Wire (Telephone Line Wire). As supplied to the British Post Office, Crown Agents for the Colonies, etc.

Trolley Wire H.C. Copper, Cadmium Copper and Bronze.

Available on request—Bolton Publication No. 121/2R, "Wire—Copper, Brass and Bronze".

THOMAS BOLTON & SONS LTD

HEAD OFFICE: Mersey Copper Works, Widnes, Lancs. Telephone: Widnes 2022. Telegrams: "Rolls, Widnes". LONDON OFFICE AND EXPORT SALES DEPT. 168 Regent St., W.1. Telephone: Regent 6427/8/9. Telegrams: "Wiredrawn, Piccy, London". WORKS: LANCASHIRE: Widnes and St. Helens. STAFFORDSHIRE: Froghall and Oakamoor, Nr. Stoke-on-Trent.

CVS-207

for Electrical Insulation

VULCANISED FIBRE

LEATHEROID

EBONITE

BAKELITE *(Fabric & Paper Base)*

of every type

The largest and most comprehensive range of insulating materials in the country. Supplied in sheet, rod and tube form.

For customers wishing to produce their own pressings, etc., we can offer strip and coil material in widths to suit requirements. Right material. Right delivery. Right price.

Also **Turned and Pressed Parts**

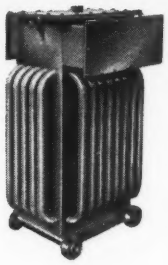
HEAVEN, DOWSETT & Co Ltd.

INSULATION HOUSE, 315 WELLINGTON ROAD BIRMINGHAM 20

Phone: BIRchfield 6218-9 *Grams:* Fibre B'ham 20

MILFORD

TRANSFORMERS



For Distribution and Industrial Purposes

150 W to 100 kVA

Specials to customers' requirements

QUICK DELIVERY

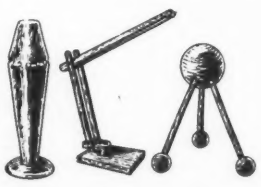
SWT

Consult us for urgent transformer breakdown repairs

SOUTH WESTERN TRANSFORMER CO.

56-60 Milford Street, Salisbury, Wilts. *Salisbury 2538*

if it's made in we make it WOOD



WOODEN PARTS FOR CONTEMPORARY LAMPS *of every description*

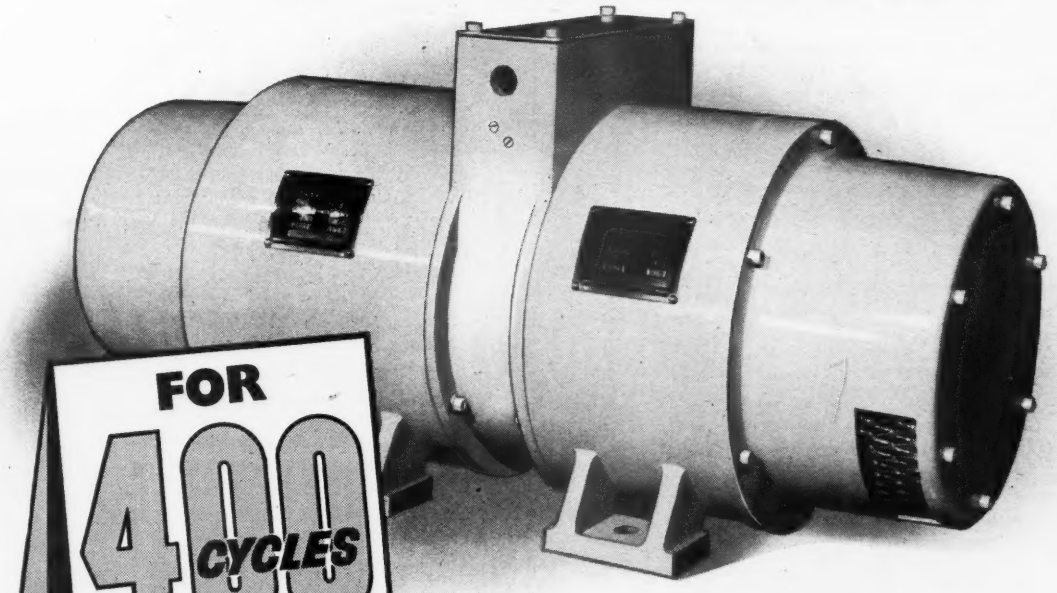
The Leading Specialists in Mass Produced Woodware

THE LUNDEGARD HARDWOOD CO. LTD.

161 Borough High Street London, S.E.1

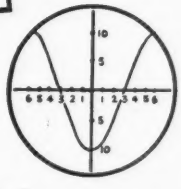
Telephone: HOP 4844

Frequency Changers



FOR 400 CYCLES POWER SUPPLIES
200/115 volts 3 phase output

1 K.V.A. Frequency Changer. Input: 415 Volts; 3 Phase; 50 Cycles. Output: 200 Volts; 3 Phase; 400 Cycles.



Scientific Research Laboratories, Aircraft Applications, and other equipment calling for a high degree of electrical performance.

Good inherent voltage and frequency regulation, and negligible harmonic content in the voltage wave-form.

Enquiries welcomed for any type of special purpose rotating electrical equipment.

VERNONS INDUSTRIES LIMITED

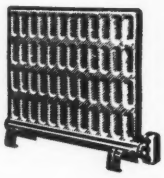
KIRKBY TRADING ESTATE KIRKBY, LIVERPOOL · Tel. SIMonswood 3261

the big, new, exciting range of electric heaters from dimplex

Which really cater for every home, every purse and pocket!

FOR LONG TERM HEATING

The famous 'Dimplex' permanently oil-filled thermostatically controlled electric radiators. Big range of models, ½ — 2 kw. Eight colours.
Write, too, for details of the new Dimplex Junior Model.



FOR SHORT TERM HEATING

Domestic Infra-red Heaters incorporating new features. Loading 750 watts.

FOR SHORT AND LONG TERM HEATING

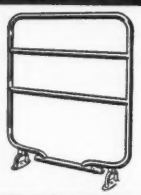
Convector Heaters — Skirting Board Styled — two sizes which can be built up in multiples.

FOR THE HOUSEWIFE

Airing Cupboard Heaters — permanently oil-filled — safe, scorch free and economical in use.

FOR EVERY BATHROOM

Electric Towel Rails — permanently oil-filled — four models available.



AND FOR INDUSTRY

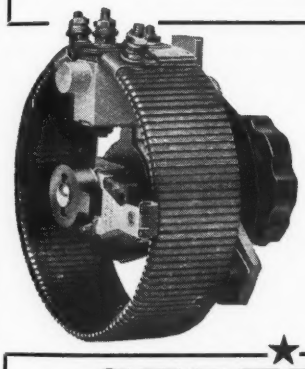
Infra-red Heaters — 2½ kw and 4 kw. Flameproof Electric Radiators — fully Buxton certified.

This advertisement will appear in 70 million copies of monthly magazines between September and Christmas and in scores of newspapers all round the country. Yes indeed, big backing for YOU, plus new literature, new showcards. Write for a supply today.

DIMPLEX LTD
MILLBROOK
SOUTHAMPTON
Tel. 74425 - 9

A range of extremely robust

ROTARY RHEOSTATS



Open or enclosed types
100 watts
150 watts
200 watts
Larger sizes quoted on request

An extremely robust rheostat with a unique metal cored former (patent appd. for)

Full details from the manufacturers

The **CURTIS** *Manufacturing Company Limited*
26-28 PADDENSWICK ROAD
HAMMERSMITH, W.6
Telephone: RIV. 4456 and 4583

Airscrew Axial Flow fans cover practically every application of this type of fan. The STANDARD RANGE is from 12" to 27".

Airscrew Centrifugal Fans—Forward Curve, Paddle Blade and Backward Curve — cover nearly all cases where a centrifugal fan is indicated.

Airscrew *standard* fan ranges

—Specifications that mean what they say

These two AIRSCREW standard Fan Ranges—Axial Flow and Centrifugal—can usually be relied upon to provide the fan you need at the time you need it. Every phase of design and manufacture is so closely controlled that we *guarantee* no AIRSCREW Fan will give less than its rated duty—though it may give more. The Airscrew Technical Service is ready and willing to assist in the selection of the correct fan whether from standard range or individually designed.

Airscrew fans for industry

THE AIRSCREW COMPANY & JICWOOD LTD., WEYBRIDGE, SURREY. Tel: Weybridge 2242/7

Regional Guide to ELECTRICAL CONTRACTORS

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Electrical Installations
E. R. REDCLIFFE (ELECTRICAL) LTD.
2 Station Road, Chingford, E.4
Telephone: SILverthorn 2356/7

J. G. SNEATH LTD.
Wallwood Street, Limehouse, E.14
Telephone: EAst 2428-9
Rewinds and Repairs. Industrial Installations

Motor and Generator Repairs and Rewinds, Lighting and Power Installations. Factory Maintenance Contracts
COLLINS ELECTRICAL LTD.
115 Clerkenwell Road, E.C.1
Telephone: HOLborn 0212-3-4 & CANonbury 3227-8

Lighting, Heating and Power Installations. Factory Maintenance and Motor Stockists
C. J. FERGUSON & SONS LTD.
33 Barbican, London, E.C.1
Telephone: MONarch 5474-5

Industrial Installations. Power, Heating and Lighting. Factory Maintenance. Electrical Engineers. Break-down Specialists
F. A. ORRICK & CO. LTD.
157 Camberwell Road, S.E.5
Telephone: RODney 5548

BARLOW & YOUNG LTD.
55 Catherine Place, Westminster, S.W.1
Telephone: VICtoria 7373
Installations of all Types

BERKELEY ELECTRICAL ENG. CO. LTD.
Vincent House, Vincent Square, S.W.1
Telephone: VICtoria 8051
Electrical Engineers and Contractors

H. J. CASH & CO. LTD.
Caxton House, Tothill Street, S.W.1
Telephone: WHItehall 4774
Electrical Engineers and Contractors

EDMUNDSONS CONSTRUCTION CO. LTD.
Electrical Engineers and Contractors
24-30 Gillingham Street, S.W.1
Telephone: VICtoria 1713

One of the Largest Electrical Contractors in the Industry
ELECTRICAL INSTALLATIONS LTD.
65 Vincent Square, Westminster, S.W.1
Telephone: VICtoria 2266 (10 lines)

. . . for all electrical installations
F. H. WHEELER & CO. LTD.
39 Victoria Street, S.W.1
Telephone: ABBey 8080 (8 lines)

TROUGHTON & YOUNG LTD.
2 Basil Street, London, S.W.3
Telephone: Kensington 3444
Electrical Engineers and Contractors

BURDETTE & CO. LTD.
150 Clapham Manor Street, S.W.4
Telephone: MACaulay 4555
Industrial Installations. Motor and Generator Repairs. Metallizing Treatments. Complete Electrical Maintenance. Heating and Ventilating.

WILSON ELECTRIC (BATTERSEA) LTD.
122a, Clapham Manor Street, S.W.4
Telephone: MAC 6768 & 3737
Electrical Engineers and Contractors. Motor Rewinds and Repairs. Installations. " Delco " Electric Motors—Approved Stockists and Repairers.

Industrial Installations throughout the Country. Power, Maintenance and Insurance
CITY ELECTRICAL CO.
Emerald Street, W.C.1 *Telephone: HOL. 9722 (6 lines)*
Repairs and Rewinds—Motor Stockists

A. TINDALL & SONS
22 Rosemary Avenue, Enfield
Electrical Engineers and Contractors
Telephone: ENField 6612 (3 lines)

SERVICE ELECTRIC CO. LTD.
Secomak Works, Honeypot Lane, Stanmore, Middx.
Telephone: EDGware 5566-7-8-9
Electrical Installations of every kind. Motor Rewinds. Factory Maintenance

DYNAMO & MOTOR REPAIRS LTD.
North End Road, Wembley Park
Telephone: Wembley 3121
Motor and generator repairs and rewinds. Installations and factory maintenance. Electrical plant stockists

SOUTH EASTERN

GALLIERS
32 St. James's Street, Brighton
Telephone: Brighton 23201-2-3
Farm and Dairy Electrical Equipment

Electrical, Refrigeration and Radio Engineers. Installation Contractors. Lifts. Television
H. BENEY & SONS LTD.
99 South Street, Eastbourne
Telephones 4820/1 (Day and Night)

For first-class A.C. and D.C. Rewinds and Industrial Plant Maintenance
ELECTRICAL POWER REPAIRS (Gillingham) LTD.
Strover Street, Gillingham, Kent
Telephone: Gill. 5200 & 59356 (Day and Night)

Heavy Engineering and Electrical Contracting
DRAKE & FLETCHER LTD.
Maidstone, Kent
Telephone 2284
Refrigeration. Oil Heating and Drying Installations

F. W. BLANSHARD LTD.
23 Lansdowne Road, Purley, Surrey
Telephone: Uplands 4818, 4819 & 4810
Complete electrical installations. Rewinding and repair of motors and transformers. Manufacturers of control gear for fluorescent.

SOUTHERN

. . for all electrical installations
F. H. WHEELER & CO. LTD.
32 Brassey Road, Winton, Bournemouth
Telephone: Winton 1609

. . . for all electrical installations
F. H. WHEELER (Southern) LTD.
Clifton Hall, Oakley Road, Shirley, Southampton
Telephone 73867

SOUTH WESTERN

. . . for all electrical installations
F. H. WHEELER (Bristol) LTD.
55 Queen Charlotte Street, Bristol 1
Telephone 26907

CLARKE BROS. (Stroud) LTD.
Bath Road, Stroud
Telephone: Stroud 1132/3
Electrical Engineers and Contractors
Rewinds and Repairs. Industrial Installations

EASTERN

Norwich .... Cambridge Gt. Yarmouth .... Lowestoft .... Ipswich
EASTERN & HOME COUNTIES ELECTRICAL CONTRACTORS
Specialists in Large Scale Electrical Installation Contracts.
Westwood House, Southtown Road, Gt. Yarmouth
Telephone: Gt. Yarm. 2390

EAST MIDLANDS

Electrical Engineers and Contractors
C. A. J. BILLINGTON LTD.
Cranfield, Bedfordshire
Telephone: Cranfield 293
Industrial Installations throughout the Home Counties

PENNEY & PORTER LIMITED
Riverside Works, Lincoln
Telephone: Lincoln 11337
Industrial & Domestic Electrical Installations. Motor & Generator Repairs & Rewinds. Lift & Plant Maintenance. Neon & Illuminated Signs

MIDLANDS

Electrical Industrial Installations. Power, Heating and Lighting. Factory Maintenance. E.C.A. Electrical Engineers
PARKER, WINDER & ACHURCH LTD.
259 Broad Street, Birmingham 1
Telephone: MIDland 5001

WALKER BROS. (ELECTRICAL ENGINEERS) LTD.
Quality House, Temple Row, Birmingham 2
Telephone: CEN. 7611/5
Electrical Installation Engineers. Industrial Installation Specialists
Established 1895

(Continued on page 94)

(Continued from page 93)

HARRIS & SHELDON LTD.
31 Stafford Street, Birmingham 4
Telephone: Central 7101
For all electrical contracting installations, lighting, heating, power, public address, etc.

Electrical and Mechanical Engineers, Factors
THE BIRMINGHAM POWER TRANSMISSIONS LTD.
56-62 Miller Street, Aston, Birmingham 6
Telephone: AST. 2088-9

For Electrical Installations of Quality consult:
HAROLD F. WARD LIMITED
420 Stratford Road, Birmingham 11
Telephone: VIC. 4041 (5 lines)

. . . for all electrical installations
F. H. WHEELER & CO. LTD.
553 Moseley Road, Birmingham 12
Telephone: Calthorpe 2601-2

DYNAMO & MOTOR REPAIRS LTD.
Belgrave Terrace, Soho Road, Birmingham 21
Telephone: Northern 0898
Motor and generator repairs and rewinds. Installations and factory maintenance. Electrical plant stockists

ELECTRICAL INSTALLATIONS LTD.
Faraday Works, Stoney Stanton Road, Coventry
Telephone 2970
Industrial Electrical Work of All Kinds. Over 40 Years' Experience

G. G. WALKER & CO. (Dudley) LTD.
31 Hall Street, Dudley
Telephone 4474/5
Rewinds, Lighting, Power, Electric Furnace, Electronic Installations and Maintenance. Est. 40 years. E.C.A. Members.

THE TRUMAN ELECTRICAL COMPANY
40-42a Upper Bridge Street, Walsall, Staffs
Telephone 2198 (3 lines)
Electrical Installations, Heating and Ventilating

SOUTH WALES

CLARKE BROS. (Stroud) LTD.
Green Park Street, Aberavon
Telephone: Port Talbot 791
Electrical Engineers and Contractors
Rewinds and Repairs. Industrial Installations

. . . for all electrical installations
F. H. WHEELER & CO. LTD.
117 Woodville Road, Cardiff
Telephone 21281-2 *Telegrams: "Whelect"*

CLARKE BROS. (Stroud) LTD.
High Street, Merthyr Tydfil
Telephone: Merthyr Tydfil 377
Electrical Engineers and Contractors
Rewinds and Repairs. Industrial Installations

MERSEYSIDE & N. WALES

TROUGHTON & YOUNG LTD.
46 Rodney Street, Liverpool 1
Telephone: Royal 9231-2
Electrical Engineers and Contractors

H. J. CASH & CO. LTD.
28 Chapel Street, Liverpool 3
Telephone: Central 0452
Electrical Engineers and Contractors

YORKSHIRE

Electrical Engineers and Contractors
SOUTHERN & REDFERN LTD.
Woodhead Road, Bradford 7
Textile Maintenance, Repairs and Rewinds
Telephones: Bradford 23871—Late Phone: Bradford 65837

DALE ELECTRIC (YORKSHIRE) LTD.
Filey, Yorks. Also at Malton and Driffield
Telephone: Filey 2301 (3 lines)
Manufacturers of the DALE diesel and petrol electric generating plants. All types of electrical contracting. Estimates free and without obligation.

EDMUNDSONS CONSTRUCTION CO. LTD.
Electrical Engineers and Contractors
2 Hartley Hill, Leeds 2
Telephone: Leeds 33791

. . . for all electrical installations
F. H. WHEELER & CO. LTD.
44 Bank Street, Sheffield 1
Telephone 24015 (3 lines) *Telegrams: "Whelect"*

. . . for all electrical installations
F. H. WHEELER & CO. LTD.
Paver Lane, York
Telephone: York 23172

NORTH WESTERN

STEWART THOMSON & SONS (Liverpool) LTD.
Fort Road, Seaforth, Liverpool 21
Repairs and Rewinds A.C. and D.C. to 3,000 horsepower. Breakdowns, Urgent Repairs, etc. 24-hour service
Telephone: Bootle 2697-8

. . . for all electrical installations
F. H. WHEELER & CO. LTD.
Regal Buildings, Oxford Road, Manchester 1
Telephone: Central 8207-8

Industrial Installations
W. H. SMITH & CO. ELECTRICAL ENGINEERS LTD.
12 York Street, Manchester 2
Telephone: CENtral 2991-6
Works: Praed Road, Trafford Park, Manchester 17

THE NELSON ENGINEERING CO. LTD.
Telephone: Nelson 1545/6
Electrical and Mechanical Engineers.
Complete Industrial Installations. Rewinds
Netherfield Road, Nelson

H. J. CASH & CO. LTD.
28 Chapel Street, Liverpool 3
Telephone: Central 0452
Electrical Engineers and Contractors

NORTH EASTERN

DALE ELECTRIC (YORKSHIRE) LTD.
Filey, Yorks. Also at Malton and Driffield
Telephone: Filey 2301 (3 lines)
Manufacturers of the DALE diesel and petrol electric generating plants. All types of electrical contracting. Estimates free and without obligation.

. . . for all electrical installations
F. H. WHEELER & CO. LTD.
52 Elswick Road, Newcastle
Telephone: Newcastle 36271

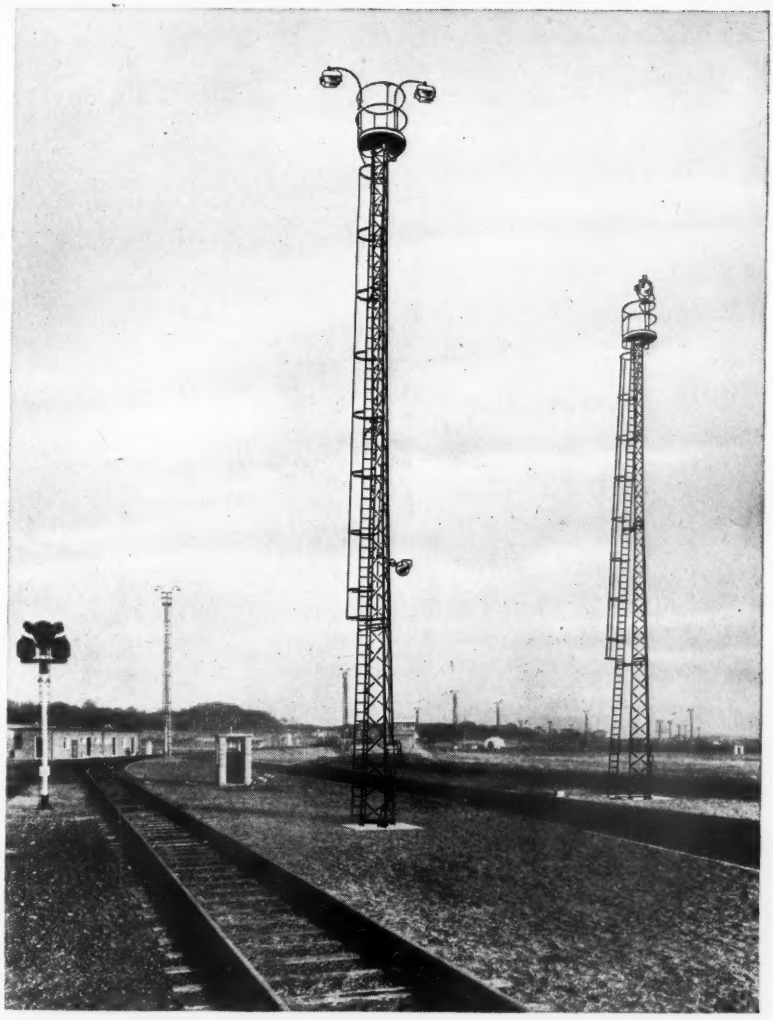
Applications for particulars of costs and standard style of advertisements in this Regional Guide should be addressed to:
THE ADVERTISEMENT DEPARTMENT
ELECTRICAL REVIEW,
DORSET HOUSE, STAMFORD STREET,
LONDON, S.E.1

Cable Racks & Hangers

SEND FOR LIST OF STANDARDISED SIZES

E.D.L.

THE ELECTRIC DEPÔT LTD. PRITCHETT STREET BIRMINGHAM 6
Phone: ASTon Cross 1381



FOR BRITISH RAILWAYS
MARSHALLING YARD,
THORNTON, FIFE

TUBEWRIGHTS STANDARD FLOODLIGHTING TOWERS

The lanterns for this modern marshalling yard are supported by 35 Standard Floodlighting Towers Type 50 (British Railways Standard), designed and fabricated by Tubewrights Ltd., to the order of B. French Ltd., 409, Victoria Street, Glasgow. The triangular towers are made in easily handled all welded steel units which are bolted together on site. Tubular steel construction gives a clean appearance; moreover, wind loading is reduced and lighter members can be used with a saving in weight, cost of erection and maintenance.

Registered Trade Mark

TUBEWRIGHTS LTD.

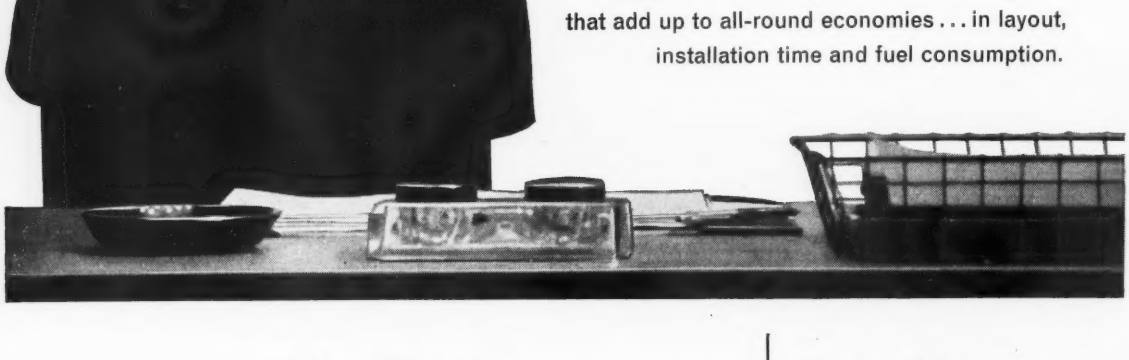
25 BUCKINGHAM GATE, LONDON, S.W.1

Telephone: Victoria 9941

A SUBSIDIARY OF STEWARTS AND LLOYDS LIMITED

It's high time we saw the G.E.C. about **space heating**

Now is the time to see the G.E.C. about your heating; for the G.E.C. manufactures the widest range of industrial electric space heating equipment... to suit every type of installation scheme. And did you know the Company offers a free advisory service? Yes, the G.E.C. will plan schemes for you that add up to all-round economies... in layout, installation time and fuel consumption.



G.E.C.
INDUSTRIAL ELECTRIC SPACE HEATING

'Nightstor' heaters—
store by night, heat by day

overhead radiant heaters—
for economical and immediate warmth

unit fan heaters—
give an even flow of warmed air

standard tubular heaters—
provide heat to measure from a wide selection of tube lengths

For further information, write for publication H5

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2

Classified Advertisements

CLASSIFIED advertisements are PREPAID at 3/6 per line (approx. 6 words) per insertion. Where an advertisement includes a Box Number there is an additional charge of 1/-.

DISPLAYED CLASSIFIED:—48/- per inch. Cheques and Postal Orders should be crossed and made payable to ELECTRICAL REVIEW PUBLICATIONS LTD.

SERIES DISCOUNTS for consecutive insertions:—13, 5%; 26, 10%; 52, 15%.

SITUATIONS WANTED:—Three insertions under this heading can be obtained for the price of two if ordered and prepaid with the first insertion.

REPLIES to Box Numbers should be addressed to the Box Number in the advertisement, c/o ELECTRICAL REVIEW, Dorset House, Stamford Street, London, S.E.1, but if not to be delivered to any particular firm or individual they should be accompanied by instructions to this effect, addressed to the Manager of the ELECTRICAL REVIEW. Replies in such cases cannot be returned. The name of an advertiser using a Box Number will not be disclosed.

ADVERTISEMENTS are accepted up to **First Post on Monday** of the week of issue and should be addressed to ELECTRICAL REVIEW, Classified Advertisement Department, Dorset House, Stamford Street, London, S.E.1.

Original testimonials should not be sent with applications for employment

OFFICIAL NOTICES, TENDERS, ETC.

RURAL DISTRICT COUNCIL OF GODSTONE

TENDERS are invited for the ELECTRICAL WORKS to the following contracts:—

1. One Block of 12 Flats, Central Way, Oxted.
2. One Block of 15 Flats, Coldshott, Oxted.
3. Four Blocks of 24 Flats, Blindley Heath, South Godstone.
4. 6 Houses, Tatsfield.

The work includes for tenants and landlords installations, multi-point aerial systems, low-temperature floor heating and the supply of certain appliances. The Electrical Contractor may submit tenders for part or all the above works.

Drawings, specification and form of tender may be obtained on application to the Council's Engineer and Surveyor at the Council Offices, Oxted, Surrey, on payment of a deposit of One Guinea, which will be returned on receipt on a bona fide tender and the return of all drawings and documents supplied.

Sealed tenders enclosed in a plain envelope endorsed "Tender for Electrical Works for 51 Flats and 6 Houses, Oxted," and addressed to the Engineer and Surveyor, Council Offices, Oxted, must be delivered not later than noon on Friday, 6th December, 1957.

The Council do not bind themselves to accept the lowest or any tender, and reserve the right to accept any part or parts of the above works.

F. W. WALPOLE,
Council Offices, Clerk of the Council.
Oxted, Surrey.
16th November, 1957. 1439

WELWYN GARDEN CITY URBAN DISTRICT COUNCIL

New Water Source

Remote Control Cable

SUBJECT to the approval of the Minister of Housing and Local Government the Council intend to develop a New Water Source at Fulling Mill, Welwyn, Herts.

Tenders are invited for the provision of 2,000 lin. yards of multi-core cable and ancillary equipment.

Copies of the specification and form of tender may be obtained from the Engineer and Surveyor, Council Offices, Welwyn Garden City, Herts.

Tenders to be delivered to the undersigned in plain sealed envelopes endorsed "New Water Source, Remote Control Cable," not later than noon, Wednesday, 18th December, 1957.

The Council do not bind themselves to accept the lowest or any tender.

L. J. SLOCOMBE,
Council Offices, Clerk of the Council.
Welwyn Garden City,
Herts. 1464

COUNTY BOROUGH OF SOUTHAMPTON

TENDERS are invited from Telephone Engineers for new Private Automatic Telephone System to the Civic Centre.

Forms and particulars from Borough Architect on written application by 6th December, 1957. R.I.B.A. contract plus supplementary conditions available for inspection.

Tender to Town Clerk, Civic Centre, Southampton, by 10 a.m. 9th January, 1958. 1492

COUNTY BOROUGH OF IPSWICH

Improved Street Lighting, Trunk Road A.12

TENDERS are invited for the supply and erection of approximately 57 Group "A" Street Lighting Columns with brackets, together with the supply and fixing of approximately 57 140-watt Sodium Lanterns, Lamps and gear.

Conditions of contract may be seen and the specification and bill of quantities may be obtained from the Borough Engineer and Surveyor, 19, Tower Street, Ipswich, on the payment of £2 2s. deposit, which will be returned on receipt of a bona fide tender.

Tenders in plain sealed envelope endorsed "Improved Street Lighting, Trunk Road A.12," must be received by the undersigned not later than noon on Monday, 16th December, 1957.

The Council do not bind themselves to accept the lowest or any tender.

J. C. NELSON,
Town Hall, Ipswich. Town Clerk.
20th November, 1957. 1463

SITUATIONS VACANT

MICHELIN TYRE CO. LTD.

Stoke-on-Trent

have progressive openings for

D.O. SECTION LEADERS

with at least G.I.Mech.E. and wide experience of general mechanical design and plant layout.

DESIGNER/DRAUGHTSMEN

(a) With H.N.C. and preferably thermo-dynamics endorsement, for interesting work in connection with works services—boiler plant, steam and hydraulic applications, pipework.

(b) With H.N.C. (Mechanical) and experience mechanical design of medium to heavy process plant. Some knowledge belt and chain conveyors desirable.

(c) With H.N.C. (Electrical) and experience in 3 of the following desirable: Motor and control gear application, A.C. and D.C.; E.H.T. and L.T. distribution; Lighting schemes; Substation design and layout; E.H.T. and L.T. oil and air brake switchgear.

Commencing salary according to qualification and experience.

Contributory pension scheme, free life assurance and excellent welfare facilities.

Assistance with housing will be given if required.

Please write in confidence to—

Mr. Glendenning, c/o above

quoting reference B/ER.

1372

SOUTH OF SCOTLAND ELECTRICITY BOARD

Glasgow Area

Third Assistant Engineer, Planning and Development

APPLICATIONS are invited to fill the above vacancy at Area Headquarters. Applicants should have a sound engineering training with subsequent experience in the design and layout of large distribution systems at pressures up to and including 33 kV in a densely loaded industrial and residential area. A knowledge of the application of modern protective equipment and of the calculation of fault levels and preparation of load flow diagrams is necessary.

The possession of the Higher National Certificate or equivalent qualification is desirable.

The conditions of employment will be in accordance with the National Joint Board Agreement for the Electricity Supply Industry. The position is superannuable.

Salary scale £995/£1,055 per annum, Class L, Grade 10.

The successful candidate will require to reside within reasonable distance of Area Headquarters.

Applications on the standard form, which may be obtained from the undersigned, should be completed and returned within twenty-one days of the appearance of this notice.

A. KELSO,
P.O. Box 6, Manager.
75, Waterloo Street,
Glasgow, C.2.
15th November, 1957. 1419

NORTH WESTERN GAS BOARD

Manchester Group

Electrical Superintendent, Bradford Road Works

APPLICATIONS are invited from suitably qualified persons for the above pensionable position in Grade A.P.T. 12 (£945/£1,070 p.a.). The successful applicant will, in addition, be responsible for electrical supervision at the Rochdale Road and Salford Manufacturing Stations.

Applicants should preferably be Corporate Members of the Institution of Electrical Engineers or have passed Sections A and B or be exempt therefrom. They should have experience in the operation and maintenance of 2,500-kW, 6.6-kV alternators, H.T. and L.T. distribution systems, electric motors and starters up to 500 h.p. at 6.6 kV, and the organisation of routine electrical maintenance on a large gasworks.

Applications, giving the names of two referees and quoting Vacancy No. 132, are to reach the General Manager, Manchester Group, N.W.G.B., Town Hall, Manchester, 2, within 14 days. 1452

NATIONAL COAL BOARD

DRAUGHTSMEN (Senior Engineering—2) required in the N.C.B.'s Production Dept. at London H.Q. Knowledge of power generating plant is particularly required; H.N.C. or equivalent qualification desirable.

Salary according to qualifications and experience within inclusive range £779 - £1,045 (currently under review). Excellent career prospects. Superannuation scheme; 5-day week; canteen, etc.

Write for application form to Staff Dept. (X946/2C), N.C.B., Hobart House, London, S.W.1, before 6th December, 1957. 1446

Situations Vacant *(continued)*

CENTRAL ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited for the following vacancies in this Division :—

SENIOR DRAUGHTSMAN (Civil), GENERATION (CONSTRUCTION) DEPARTMENT
(Vacancy No. 159/57/ER).

Candidates should have experience in the preparation of detail drawings and in the design of one or more of the following subjects :—

Reinforced concrete structures.
Piled and slab foundations for heavy components.
Cable subways, bridges and culverts.

Salary will be in accordance with Grade 5 (£760-£860 per annum) or Grade 4 (£895-£995 per annum) of Schedule D of the National Joint Board Agreement.

Closing date for receipt of applications, 11th December, 1957.

STATION CHEMIST, COVENTRY POWER STATION
(Vacancy No. 205/57/ER).

Previous experience in a power station laboratory an advantage, and candidates should preferably be Associates of the Royal Institute of Chemistry or hold equivalent qualifications. The successful applicant will be required to take charge of the laboratory, the functions of which include the analysis of coal, oil, water and other substances, and the control of water softening plant.

Salary will be within Class G, Grade 7 (£935-£995 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 11th December, 1957.

STATION SHIFT CONTROL ENGINEER, CASTLE DONINGTON POWER STATION
(Vacancy No. 209/57/ER).

Applicants should have had a sound training and practical experience in a modern power station. The possession of a Higher National Certificate in Electrical Engineering, or its equivalent, would be an advantage.

Salary will be in accordance with Class L, Grade 10 (£995-£1,055 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 18th December, 1957.

These appointments will be pensionable within the provisions of the Central Electricity Authority and Area Boards (Staff) Superannuation Scheme.

Applications should be submitted on the official form AE6/ACT, which may be obtained from the Divisional Establishments Officer, Central Electricity Authority, East Midlands Division, P.O. Box 25, Barker Gate, Nottingham, and should be returned to the undersigned by the date stated. PLEASE QUOTE VACANCY NUMBER.

L. F. JEFFREY,
Divisional Controller.

20th November, 1957. 1444

CENTRAL ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following appointment :—

FIRST ASSISTANT STATION CHEMIST, GOLDINGTON GENERATING STATION (Near Bedford).

Salary N.J.B. Class G, Grade 9, £835 × £15 to £880 p.a., rising early in 1958 to Class H, £885 × £15 to £930 p.a.

Applicants should have a minimum qualification of Higher National Certificate in Chemistry, and should be familiar with the work of a generating station laboratory. Experience of modern water treatment and knowledge of chemical problems associated with generating station plant would be an advantage.

Applications, quoting reference No. 2/8650, stating age, qualifications, experience and present position, should be sent to the Controller, Central Electricity Authority, Eastern Division, West Farm Place, Chalk Lane, Cockfosters, Barnet, Herts, by 7th December, 1957.

W. N. C. CLINCH,
Controller. 1443

PORT OF LONDON AUTHORITY

THE PORT OF LONDON AUTHORITY invite applications for the position of ASSISTANT ENGINEER (Electrical) at a salary of £1,265 rising by annual increments to £1,715 per annum. Commencing rate according to age and experience.

Candidates, who must be British subjects and Corporate Members of the Institution of Electrical Engineers, should have served a recognised apprenticeship with one of the major electrical manufacturing firms and should have experience in the specification, installation, operation and maintenance of the electrical equipment of a dock or harbour undertaking or heavy industrial organisation, including H.V. and L.V. distribution systems, rectifying plant, A.C. and D.C. cranes and pumping plant, large lighting schemes and V.H.F. radio-telephony.

The successful applicant will be required to become a member of the Port Authority's contributory superannuation scheme. In certain cases existing pensionable service is transferable.

Application forms may be obtained from the Establishment Officer, Port of London Authority, Trinity Square, London, E.C.3. 1352

TELECOMMUNICATION ENGINEERS

Are You Looking for an Interesting Job?

A. T. & E. Co. Ltd., Liverpool, have vacancies for

EQUIPMENT ENGINEERS

with automatic telephone exchange and kindred experience to prepare floor plans, equipment quantities, rack layouts, etc., from customers' specifications.

CIRCUIT ENGINEERS

to design circuits for auto and automanual exchanges and electronic switching purposes.

LABORATORY ENGINEERS

for set-up and test of circuits and equipment prior to manufacture.

DRAUGHTSMEN

with experience in light electrical and mechanical apparatus, wiring and equipment.

If you are ambitious and want a change, write to us, giving full details of your work, age and experience, and let us decide if it would be to your advantage to come for an interview. This would be at our expense, and arranged at a mutually convenient time.

The positions are on permanent staff with generous pension fund (contributory) and full range of welfare activities, including medical and dental facilities.

Assistance will be given with housing and with removal expenses.

Write to

The Personnel Manager
AUTOMATIC TELEPHONE & ELECTRIC CO. LTD.
Strowger Works
Edge Lane, Liverpool, 7

1458

WARD & GOLDSTONE LIMITED

require a
REPRESENTATIVE

to call on all manufacturers using their products in the London area. Salary, commission and expenses paid. Car provided. Applicants must have their own personal connections at top levels and must be fully conversant with the products they will be expected to sell.

Apply giving full details of experience, references, etc., to Mr. A. G. Jackson, Director, Ward & Goldstone Limited, 5, Percy Street, Tottenham Court Road, London, W.1.

1316

EAST MIDLANDS ELECTRICITY BOARD

Second Assistant District Engineer (Planning) Burton District

APPLICATIONS are invited from suitably qualified and experienced engineers for the appointment of a SECOND ASSISTANT DISTRICT ENGINEER (Planning) in the Burton District of the Derby and Burton Sub-Area.

The duties of the appointment consist of assisting in the design and construction of both underground and overhead distribution systems up to and including 11 kV; surveying and profiling for overhead lines and of estimating and preparing schemes for approval.

The successful applicant will be required to reside in or near to Burton-upon-Trent, and may be required to undertake standby duties.

The salary will be in accordance with the National Joint Board Agreement, Class F, Grade 7 (£885 × £15 to £930 per annum).

Applications, stating age, experience, qualifications, previous and present appointments should be forwarded to The Manager, Burton District, Church Croft, Horninglow Street, Burton-upon-Trent, Staffs, so as to reach him within fourteen days of the issue of this advertisement. 1475

FEDERATION OF RHODESIA AND NYASALAND

Federal Power Board

Appointment of Operations Controller

THE Board require the services of an OPERATIONS CONTROLLER who should be a fully qualified Electrical Engineer with wide knowledge of all aspects of the operation of electricity supply systems, including the commercial aspects, and who should possess executive experience.

The Board are at present constructing at the Kariba Gorge on the Zambezi a large dam and power station having an initial capacity of 500 MW and an ultimate capacity of at least 1,200 MW. The Board are also constructing about 930 miles of 330-kV transmission line to connect the Kariba power station with a number of thermal stations in the Federation. The Operations Controller is required in connection with the operation of this integrated system.

Salary £3,500 per annum. There is a pension scheme which the successful applicant will be required to join.

Applications should be posted so as to reach the Secretary, Federal Power Board, Reliance House, P.O. Box 630, Salisbury, Southern Rhodesia, not later than 31st January, 1958.

1297

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

FOURTH ASSISTANT ENGINEER required in the Planning Section at No. 1 Sub-Area Headquarters, Liverpool. Salary £835/£880 per annum (N.J.B. L/13).

Applicants should have had experience in all aspects of the distribution of electricity, and possess knowledge of the technical and economic principles underlying the design of distribution systems, and should possess suitable technical qualifications.

Appointment subject to medical examination. Pension scheme.

Special application forms obtainable from the Manager, No. 1 Sub-Area, 24, Hatton Garden, Liverpool, 3, should be returned not later than 11th December, 1957. 1454

YORKSHIRE ELECTRICITY BOARD

No. 7 (Grimsby) Sub-Area

THIRD ASSISTANT ENGINEER (Distribution Design). Applicants should possess at least the Higher National Certificate in Electrical Engineering and should preferably be Graduate Members of the Institution of Electrical Engineers. They should have experience in the design, construction, operation and maintenance of H.V. and L.V. underground and overhead distribution systems, substation plant and ancillary equipment.

Salary N.J.B. Class J, Grade 10, £885/£15/£930 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 7 (Grimsby) Sub-Area, Yorkshire Electricity Board, Moss Rd., Grimsby, not later than 13th December, 1957.

No. 5 (Wakefield) Sub-Area

THIRD ASSISTANT DISTRICT ENGINEERS. Applicants should have had practical training and experience in the construction, operation and maintenance of H.V. and M.V. overhead and underground distribution network, substation plant and ancillary equipment.

Candidates should preferably have attained the technical standard of the Higher National Certificate in Electrical Engineering or equivalent qualifications.

Candidates must be prepared to reside in the District they are appointed and undertake standby duties.

Doncaster District — Two posts.
Castleford District — Two posts.

Salary N.J.B. Class F, Grade 9, £790/£15/£835 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 5 (Wakefield) Sub-Area, Yorkshire Electricity Board, 1a, Denby Dale Road, Wakefield, not later than 13th December, 1957. 1479

ENGLISH ELECTRIC, STAFFORD

RELAY TENDERING ENGINEERS

OPPORTUNITIES exist in the expanding Relay Department for Engineers to handle Power Systems Protective Relay Tenders. Applicants should preferably have had experience in the light electrical manufacturing industry and be technically qualified at least to the Ordinary National Certificate standard. These appointments are permanent, progressive and will rank for normal admission after the usual probationary period into the company's staff pension scheme.

As well as providing an opening into an interesting and promising career we should also mention that this work is carried on in a large new office building under pleasant and congenial surroundings.

Suitable applicants will be invited to Stafford at our expense for preliminary interview when as well as being given the opportunity of assessing the nature of the work they would undertake they will also be able to gain an impression of life in a county town.

Applications giving full details of experience and qualifications should be addressed to Dept. C.P.S., 336/7, Strand, London, W.C.2, quoting Ref. ER1297H.

1421

CENTRAL ELECTRICITY AUTHORITY

South Western Division

STATION SHIFT CONTROL ENGINEER required at East Yelland Power Station.

Superannuation scheme. Salary N.J.B. Class H, Grade 10, £835-£889 plus 10% for shift duties.

Candidates should possess good technical qualifications and have had training and experience in the control and operation of steam generating plant and main switchgear.

Applications on form A.E.6/ACT obtainable from the Divisional Secretary, 26, Oakfield Road, Bristol, 8, should be completed and returned by 7th December, 1957. 1477

THE LANCASHIRE DYNAMO GROUP

Birmingham Area Sales Manager

APPLICATIONS are invited for the above appointment from candidates having suitable qualifications, training and experience in the sales of

ELECTRICAL ROTATING MACHINERY.
TRANSFORMERS.
RECTIFIERS.
SWITCHGEAR.
INDUSTRIAL ELECTRONIC EQUIPMENT.

Considerable importance is also attached to administrative ability, and experience in the control of a number of sales engineers, estimators and service engineers operating over an area, together with a sound knowledge and experience of office routine, the preparation of estimates, contracts, statistical and budgetary information, including market appraisals.

The remuneration for this post ranges from £1,500 to £2,000 per annum, and the commencing salary will depend on qualifications and experience.

A car will be provided and there is an excellent pension scheme which the successful applicant will be required to join.

Applications will be treated in strict confidence and should be sent to the Secretary, Lancashire Dynamo Group Sales Ltd., St. Stephen's House, Victoria Embankment, London, S.W.1, giving full personal details, including education, training and experience. 1428

ELECTRICAL ENGINEER
for
NUCLEAR GROUP

THE DE HAVILLAND ENGINE COMPANY LTD., invite applications for the above position.

Applicants who should be not less than 25 years of age, must have served an indentured apprenticeship in electrical engineering and be either a Graduate of the Institution of Electrical Engineers or hold a Higher National Certificate and have theoretical knowledge and practical experience in the following fields:—

A.C. and D.C. rotating machinery, switchgear, control gear and protective systems, industrial electronics and electrical installations.

Salary according to age, qualifications and experience.

Written applications only, quoting reference S.C.742 to

The Personnel Officer
THE DE HAVILLAND ENGINE COMPANY LIMITED
Leavesden, Watford, Herts.

1403

ADMIRALTY

TRAINEE ELECTRICAL DRAUGHTSMEN required for unestablished appointments in Bath. Candidates must be British subjects aged 21 and upwards and have been apprenticed or had equivalent workshop experience in one or more branches of electrical engineering in factories or shipyards. Free training in drawing and electrical engineering technology for four months beginning February, 1958, at Bath Technical College.

Salary during training £510 (age 21) to £685 according to age and experience, increased (except at age 21) on satisfactory completion of training. 5-day week. 18 days' annual leave.

Substantial grants towards travelling expenses for all candidates called for interview.

Apply giving details of age, technical qualifications, apprenticeship (or equivalent) and experience to Admiralty, C.E.II (114), Empire Hotel, Bath. 1418

SOUTH EASTERN ELECTRICITY BOARD

ASSISTANT DISTRICT ENGINEERS within the Surrey Sub-Area. N.J.B. Class F, Grade 9. Dorking & Epsom District 1; Woking District 1. Salary £790 × £15 to £835 per annum. Superannuable.

N.J.B. Class E, Grade 9, Guildford District 1. Salary £740 × £15 to £785 per annum. Superannuable.

Applicants of good general education should be technically trained up to H.N.C. standard with practical experience of distribution work on H.V. and L.V. systems. Ability to plan and prepare schemes for mains extensions would be an advantage.

Applications naming two referees on forms from C. W. Hughes, B.Sc., M.I.E.E., Surrey Manager, SEEBOARD, Rough Rew, Ridgeway Road, Dorking, Surrey, by 11th December, 1957.

ASSISTANT (Consumers' Service), Dorking and Epsom District.

Salary £690 × £20 to £750 per annum under Grade 3 of the N.J.C. Agreement. Superannuable.

Applicants should have a wide knowledge and experience in the work associated with consumers' service including applications for supply, tariffs and records, and should be able to deal with correspondence and undertake the supervision of the staff in the section. 38-hour week with alternate Saturdays free. Generous leave and sick pay schemes.

Applications naming two referees on forms from C. L. B. White, District Manager, SEEBOARD, 56, South Street, Dorking, by 11th December, 1957.

A. L. BURNELL,
Secretary.

1474

EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments. The successful candidates will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Chilterns Sub-Area, Luton District

GENERAL ASSISTANT ENGINEER (147/57.R).

Candidates should have had a sound general and technical education and should possess the Higher National Certificate or equivalent qualification. Some experience in H.V. and L.V. distribution systems is desirable.

Salary N.J.B. Class H, Grades 15/16 (£540-£635), the grade to be dependent upon qualifications and experience.

Apply by letter, within 14 days, to the Manager, Luton District, Eastern Electricity Board, 487, Dunstable Road, Luton, Beds.

Northmet Sub-Area, St. Albans District

(a) SALES REPRESENTATIVE, Hatfield Service Centre (Ref. 700) (149/57.R).
(b) SALES REPRESENTATIVE (Ref. 678) (150/57.R).

The duties will be advising consumers on commercial matters associated with supply, tariffs and apparatus sales, in accordance with the N.J.C. Agreement. The successful candidate for appointment (a) will be expected to assist with service centre work when required and to work the normal service centre hours.

Salary N.J.C. Grade 1 (£500-£600).

For these appointments apply by letter to F. J. Drake, Assoc.I.E.E., Manager, Eastern Electricity Board, 107, St. Peter's Street, St. Albans, Herts, by 9th December, 1957. 1465

CENTRAL ELECTRICITY AUTHORITY

Midlands Division

STATION SHIFT CONTROL ENGINEER is required at Hams Hall "A" Power Station near Birmingham. N.J.B. service conditions, superannuable appointment, salary within Schedule A of the Agreement, Grade J10, £885-£930 per annum, plus 10% of basic salary for shift duties.

A sound technical training and practical experience in the control of steam generating plant and main switchgear are required. Appropriate technical qualifications an advantage.

Apply, quoting Vacancy No. 686MD, on form AE6, available from the Establishments Officer, 53, Wake Green Road, Moseley, Birmingham, 13, by 10th December, 1957. 1441

***Situations Vacant** (continued)*

CONTRACTS ENGINEERS

A. REYROLLE & COMPANY LTD., of Hebburn, County Durham, who are the largest firm of switchgear specialists in the world, have vacancies for CONTRACTS ENGINEERS both for home and overseas contract work on E.H.V. switchgear. In addition, vacancies also exist for CONTRACTS ENGINEERS to handle work in connection with major industrial installations and medium-voltage switchgear.

The appointment would be for work at Hebburn, and it is customary for the company to appoint engineers for duties in the overseas and home area offices from engineers trained at Hebburn.

The work requires initiative and affords the engineer individual responsibility. It is interesting and varied and calls for ability to conduct both technical and commercial negotiations. The desirable qualifications are therefore a Degree or a Higher National Diploma or Higher National Certificate, but candidates having Ordinary National Certificate who are still proceeding with studies could be considered specially. Applicants need not have specialised previously in switchgear, and if necessary suitable introductory training would be arranged.

Applications, giving full particulars of technical training and previous experience, should be forwarded to the Contracts Manager, A. Reyrolle & Co. Ltd., Hebburn, Co. Durham, marked "Personal." 1448

'ENGLISH ELECTRIC'

RUGBY

ENGINEERS are required for the Sales and Contracts departments of the STEAM TURBINE DIVISION at Rugby. These vacancies are for engineers between 30 and 40 years of age, who have served a student or graduate apprenticeship in power engineering and who are qualified for Associate Membership of the Institution of Mechanical Engineers.

Previous steam turbine experience is desirable for the sales department appointments, but other heavy plant experience would be considered for the contracts positions.

The appointments are permanent and good opportunities exist for men with the required experience who can, when the occasion demands, deal direct with customers at home and abroad.

The appointments offer good salaries, and rented houses or flats and removal expenses can be granted to suitable applicants.

Write giving details of previous experience and present appointment to Dept. C.P.S., 336/7, Strand, London, W.C.2, quoting Ref. ER.1197B.

1457

SOUTH WESTERN ELECTRICITY BOARD

SUB-AREA COMMERCIAL OFFICER, BRISTOL. Salary N.J.M.C. Class C, Grade 5 (£1,900/£2,100 p.a.).

The successful candidate will be responsible to the Manager, Bristol Sub-Area, for the organisation and control of all commercial activities in the Sub-Area, including negotiation of supplies and tariffs and supervision of workshops, estimating and contracting, an extensive hiring scheme, consumer service, sales and publicity. Extensive experience appropriate thereto essential. Administration and engineering experience and an appropriate technical qualification advantageous.

This post covers responsibility for the area encompassed by the present Bristol Sub-Area boundary, i.e. Bath, Bristol and Weston Districts, but eventually the area will be reduced to cover the boundaries of Bristol and Weston Districts only.

Applications on standard form AE6/ACT obtainable from Manager, Bristol Sub-Area, Electricity House, Bristol, 1, should be returned, together with supporting letter, by 10th December. 1473

CENTRAL ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited for the following appointments in this Division :—

SENIOR ASSISTANT ENGINEER, GENERATION (Operation) DEPT., OPERATIONAL RESEARCH SECTION, DIVISIONAL HEADQUARTERS (Vacancy No. 213/57/ER).

Applicants should be fully qualified electrical or mechanical engineers and previous experience of operational research is desirable but not essential, as there will be opportunities for training in the technique.

Salary will be in accordance with Class AX/EX, Grade 3, £1,330-£1,595 per annum) of Schedule B of the National Joint Board Agreement.

Closing date for receipt of applications, 18th December, 1957.

The appointment will be pensionable within the provisions of the Central Electricity Authority and Area Boards (Staff) Superannuation Scheme.

Applications should be submitted on the official form AE6/ACT, which may be obtained from the Divisional Establishments Officer, Central Electricity Authority, East Midlands Division, P.O. Box 25, Barker Gate, Nottingham, and should be returned to the undersigned by the date stated. PLEASE QUOTE VACANCY NUMBER.

L. F. JEFFREY,
Divisional Controller.

22nd November, 1957. 1478

AIR MINISTRY

STATION ENGINEERS (G.D.) and STATION ENGINEERS (Mech.) required at R.A.F. and M.T.C.A. Stations. Qualifications required (a) O.N.C. Electrical or Mechanical or show that equivalent standard of technical education attained; (b) recognised apprenticeship in electrical or mechanical engineering with firm or establishment of good repute; (c) 3 years' employment in electrical and mechanical engineering preferably on operation and maintenance of mine, factory or workshops plant and services. Preference given to candidates with supervisory experience subsequent to (b) and (c).

Work consists of installation, operation and maintenance and high medium voltage electrical distribution system electrical installation, generating plant, steam and hot water heating systems and miscellaneous works plants, tools and equipment.

Commencing salary according to age, qualifications and experience on range £655-£820. Appointments non-pensionable. Liability for tours of duty overseas for which special allowance payable in addition to higher salary.

Applications from natural born British subjects only, up to age 45 years.

Write giving age, full details of qualifications and experience (quoting PE.3140 and PE.3141) to Manager, Ministry of Labour and National Service, 1-6, Tavistock Square, London, W.C.1. Only candidates selected for interview will be advised. 1470

ELECTRONIC TECHNICIANS

HILGER AND WATTS LTD. invite applications from young men for testing and adjusting electrical instruments. Applicants should be of the standard of G.C.E. "O" level or O.N.C. in Physics and Maths., and have some background of electrical or electronic experience. Higher qualifications would be acceptable for posts of greater responsibility.

After a period of training the successful candidates would be required to do part-time servicing.

Five-day week, canteen and superannuation scheme.

Please apply in writing giving details of age, experience and salary required, quoting reference B7, to Personnel Officer, Hilger and Watts Ltd., 98, St. Pancras Way, Camden Road, London, N.W.1.

1456

CENTRAL ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited for superannuable posts. Conditions of service in accordance with N.J.B. Agreement, Schedule A or B. Salary includes London allowance. Qualifications entitling to Graduate Membership of the I.E.E. or I.Mech.E. an advantage.

STATION SHIFT CONTROL ENGINEER, ST. PANCRAS POWER STATION (Vacancy No. 57/1068).

Sound technical training with D.C. and H.T. switchgear operating experience. Salary Class E, Grade 10, £725 + £68 10s. shift p.a.

ASSISTANT SHIFT CHARGE ENGINEER, WOOLWICH POWER STATION (Vacancy No. 57/1069).

Sound engineering and technical training with modern H.P. plant operating experience. Salary Class H, Grade 9=£935 + £88 10s. shift p.a.

ASSISTANT ENGINEER (Operation), DEPTFORD EAST POWER STATION (Vacancy No. 57/1070).

Technical training to O.N.C. level and preferably with control room or boiler house experience. Salary Class K, Grade 10=£985 + £93 10s. shift p.a.

Applications quoting vacancy number to (or on form from) Central Electricity Authority, London Division, P.O. Box 136, London, W.1, by 9th December, 1957. 1476

CENTRAL ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following position at South Denes (Great Yarmouth) Generating Station :—

ASSISTANT SHIFT CHARGE ENGINEER.

Salary N.J.B. Class H, Grade 9, £885 × £15 to £930 per annum plus 10% shift allowance.

The duties will involve the supervision and control of boiler/turbine units.

Applicants should preferably have served an apprenticeship and have obtained a National Certificate in Electrical and/or Mechanical Engineering, or equivalent. Experience is desirable in the operation of modern boiler and turbine plant, together with electrical control room experience.

The station, which is at present under construction, will have an ultimate capacity of 240 MW. Steam conditions will be 900 lb. sq. in., 900° F., with boilers oil fuel fired.

Applications, quoting reference No. 2/8648, stating age, qualifications, experience and present position, should be sent to the Controller, Central Electricity Authority, Eastern Division, West Farm Place, Chalk Lane, Cockfosters, Barnet, Herts, by 14th December, 1957.

W. N. C. CLINCH,
Controller. 1442

BRITISH ELECTRICAL DEVELOPMENT ASSOCIATION

THE E.D.A. Testing House is a national institution responsible for testing for safety and performance all types of domestic appliances, agricultural and light industrial equipment on behalf of Electricity Boards and the British Standards Institution. This interesting work is carried on in modern laboratories situated in Leatherhead, Surrey. Canteen facilities are available and the Association is operating a pension scheme. Applications are invited for vacancies in the following grades :—

TEST ENGINEERS. Applicants should have previous experience in an electrical testing laboratory; a knowledge of the design of domestic electrical appliances advantageous. Higher National Certificate in Electrical Engineering or Physics, or similar qualifications. Salary within the range £810/£935 per annum.

ASSISTANT TEST ENGINEER. Applicants should have an interest in electrical testing and have attained as a minimum qualification National Certificate in Electrical Engineering or Physics. Salary within the range £550/£625 per annum.

Apply in writing to the Director, British Electrical Development Association, 2, Savoy Hill, London, W.C.2. 1420

SOUTH OF SCOTLAND ELECTRICITY BOARD

Stirling Area

APPLICATIONS are invited for the following posts:—

1. SECOND ASSISTANT ENGINEER in the Planning Section of Stirling Area Headquarters;
2. GENERAL ASSISTANT DISTRICT ENGINEER at Falkirk; and
3. GENERAL ASSISTANT DISTRICT ENGINEER at Stirling.

Applicants should have had a sound engineering training and preferably be in possession of a National Certificate in Electrical Engineering or equivalent.

Conditions of service and salaries will be in accordance with the National Joint Board Agreement, the present grading for post 1 being, Class H, Grade 7 (£995/£1,055), for post 2, Class F, Grade 11 (£685/£730), and for post 3, Class E, Grade 11 (£635/£680). All three posts are superannuated.

Application forms, which may be obtained from me, should be received not later than 6th December, 1957.

JAMES G. CURTIS,
Area Manager.

"Woodlands,"
St. Ninians Road,
Stirling.
12th November, 1957. 1472

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments in the Board's No. 4 Sub-Area.

Conway Valley District

SECTION ENGINEER at Llanrwst. Salary within range £835/£880 per annum (N.J.B. E/7).

SECTION ENGINEER (Operation) at Dolgarrog. Salary within range £835/£880 per annum (N.J.B. E/7).

Aberystwyth District

SECTION ENGINEER at Dolgelley. Salary within range £835/£880 per annum (N.J.B. E/7).

ASSISTANT SECTION ENGINEER at Machynlleth. Salary within range £740/£785 per annum (N.J.B. E/9).

Applicants should have had experience in the construction and operation of E.H.T., H.T. and L.T. overhead and underground distribution systems, including indoor and outdoor substation equipment. Technical qualifications desirable.

Appointments subject to medical examination. Pension scheme.

Application forms obtainable from the Manager, No. 4 Sub-Area, Electricity House, Rhostyllen, Near Wrexham.

Closing date, 11th December, 1957. 1471

ASSISTANT TO CHIEF ELECTRICAL ENGINEER

ASSISTANT TO CHIEF ELECTRICAL ENGINEER required for large factory in the Liverpool district. Experience of installation, maintenance and operational work with continuous processes and of E.H.T. and M.V. systems necessary. Chemical experience an advantage. Ability to organise and handle labour essential. Excellent prospects of quick promotion for right man. Min. quals. Graduate I.E.E. Good salary, pension scheme, assistance with housing. Age 30-40 yrs. Applications should state age, quals. and experience and be addressed to Personnel Manager, British Enka, Ltd., Aintree, Liverpool, 9. 1480

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

North Caledonia Area

THERE is a vacancy with the Maintenance Dept., Elgin, for an E.H.T. JOINTER. Applicants should be conversant with all types of jointing up to and including 11 kV. Wages and conditions of service in accordance with the N.J.I.C. Agreement. A suitable house may be available to let to the successful applicant.

Applications in writing, giving full details of age, experience, copies of testimonials or references, to the Area Manager, West Villa, South Street, Elgin, before 14th December, 1957. 1447

ELECTRICAL SUPERINTENDENTS

required by the FEDERAL GOVERNMENT OF NIGERIA for the PUBLIC WORKS DEPARTMENT for appointment on contract for one tour of 12 to 24 months in first instance. Salary, according to age and experience, in scale £834 rising to £1,386 a year. Gratuity at rate of £100/£150 a year. Outfit allowance £60. Free passages for officer and wife. Assistance towards children's passages and grant up to £150 annually towards maintenance in U.K. Liberal leave on full salary.

Candidates must either :—

(a) have five years' responsible experience in electrical contracting work, and preferably have knowledge of electrical maintenance of air conditioning and oil engine standby generating plant, or

(b) have served full apprenticeship with manufacturer or company undertaking repair and rewinding of electrical motors from fractional horse-power to 100 h.p., and have five years' subsequent responsible experience on rewinding of motors.

Write to the Crown Agents, 4, Millbank, London, S.W.1. State age, name in block letters, full qualifications and experience, and quote M2C/42511/EF. 1426

TELECOMMUNICATIONS ENGINEERS

THE Paris headquarters of a world-wide organisation has a number of vacancies for ENGINEERS, ASSISTANT ENGINEERS and TECHNICAL WRITERS for the following :—

TROPOSPHERIC RADIO SYSTEMS.
CARRIER TELEPHONY SYSTEMS.
MICROWAVE INSTALLATIONS.
DATA TRANSMISSION EQUIPMENT.

Appointments will be for two or three years initially ; suitable candidates will be considered for subsequent permanent employment. The positions carry generous salaries and liberal living allowances.

Write stating technical qualifications and experience to—Box 1427.

ALBRIGHT & WILSON (MFG.) LIMITED

require first-class tradesmen to work in its Oldbury factory. There are at present vacancies for:—

FITTERS
WELDERS
INSTRUMENT MECHANICS
ELECTRICIAN
CARPENTER

A merit rating scheme ensures good pay to good tradesmen and there are excellent canteen and recreation facilities available.

Applications in writing should be made to the

Labour and Welfare Officer (Oldbury)
ALBRIGHT & WILSON LIMITED
P.O. Box No. 3, Oldbury.

1389

ESTIMATING ENGINEERS SENIOR AND JUNIOR DRAUGHTSMEN

required by

Whipp & Bourne Ltd., Castleton, Rochdale, manufacturers of A.C. and D.C. circuit breakers and switchboards. Previous experience in this field preferable. Posts are pensionable.

Apply to the Managing Director stating present salary. 1481

MIDLANDS ELECTRICITY BOARD

DEMONSTRATORS and TRAINEE DEMONSTRATORS required in the Birmingham and District Sub-Area.

Applicants must have had a good education and should have a certificate of a recognised domestic training college and/or, in the case of Demonstrators, the E.A.W. Certificate. Demonstrators' duties will include lecture demonstrations in service centres and on consumers' premises and advice to consumers on the selection and use of electrical apparatus. Trainee Demonstrators will be expected to assist with the above-mentioned duties.

Salary: Demonstrator, £500/£600 per annum (N.J.C. Grade 1), and Trainee-Demonstrator within the range of £224/£485 per annum according to qualifications and experience.

Apply by letter, within fourteen days, stating age, education, qualifications and experience to Emil Braathen, Sub-Area Manager, Midlands Electricity Board, 14, Dale End, Birmingham, 4.

A. STEPHENS,
Secretary. 1466

CENTRAL ELECTRICITY AUTHORITY

London Division

APPLICATIONS invited for following superannuable post. Conditions of service in accordance with N.J.B. Agreement, Schedule B. Salary includes London allowance.

SECOND ASSISTANT ENGINEER (Civil), GENERATION (Construction) DEPT., ERGON HOUSE
(Vacancy No. 57/1071).

Duties will involve design and calculation, specification and preparation of contract documents for major power station schemes and civil maintenance. Candidates should be suitably qualified and have had several years' experience in major civil engineering construction, tunnelling and river works. Salary Class AX/EX, Grade 4 = £1,195/£1,460 p.a.

Applications, quoting vacancy number, to (or on form from) Central Electricity Authority, London Division, P.O. Box 136, London, W.1, by 9th December, 1957. 1440

ALUMINIUM LABORATORIES LIMITED,

a large research and development establishment, require for the Electrical Division :—

(1) TECHNICAL ASSISTANT to undertake design and test work on prototype electrical apparatus. Applicants, preferably aged 25/30, should possess B.Sc.(Eng.) or equivalent and should have had experience in design, test and manufacture of rotating machinery and transformers.

(2) TECHNICAL ASSISTANT to undertake design and test work on prototype electrical overhead line accessories. Applicants should have a specialist background experience on the design and installation of o/h lines schemes and should have Corporate Membership of the I.E.E.

Pension and life assurance scheme in operation.

Apply to : Personnel Officer,
Aluminium Laboratories Limited,
Banbury, Oxon. 1356

VACANCIES IN TRANSFORMER DESIGN OFFICE

THIS company is desirous of adding to its existing personnel in the Transformer Design Office, and requires persons with a good design background on transformer work from the smaller outputs up to 1,000 kVA at 66 kV, both oil-immersed, air-cooled and special insulated types.

Applications stating details of past experience, etc., to—

THE NELSON ENGINEERING CO. LTD.
Netherfield Road, Nelson, Lancashire
1430

BRITISH KLOCKNER SWITCHGEAR LIMITED

Chertsey, Surrey

TECHNICAL SALES ENGINEERS required for London and Home Counties. Knowledge of motor control gear ; sales experience preferred but not essential. Apply giving full particulars to—Managing Director. 166

***Situations Vacant** (continued)*

WORKSHOP INSTRUCTOR
(Electrical Installation)

required by the GOVERNMENT OF CYPRUS Education Department for one or two tours of 21 months either (i) on agreement with prospect of permanent and pensionable employment, or (ii) on contract with gratuity at rate of £100 a year. Salary scale (including overseas allowance and present temporary allowance of 18% of salary) £993 rising to £1,366 a year. Outfit allowance £30. Free passages. Education grant payable in certain circumstances. Liberal leave.

Candidates must have served an apprenticeship to electrical engineering, have had subsequent experience and possess a C. and G. Full Technological Certificate in Electrical Installation Work, and preferably in Electrical Engineering Practice.

Write to the Crown Agents, 4, Millbank, London, S.W.1. State age, name in block letters, full qualifications and experience, and quote M2C/42421/EF. 1425

ELECTRONIC WIRING ASSISTANTS

APPLICATIONS are invited from men experienced in Wiring Electronic Equipment, able to work from circuit diagrams and preferably used to prototype work. Five-day week, canteen and superannuation scheme.

Please write stating age, experience and salary required, quoting Ref. B8, to :—

The Personnel Officer
HILGER & WATTS LTD.
98, St. Pancras Way, Camden Road
London, N.W.1

1455

BRITISH THOMSON-HOUSTON CO. LTD.

THE BRITISH THOMSON-HOUSTON Co. Ltd. has vacancies in its RESEARCH LABORATORY at RUGBY for ELECTRICAL ENGINEERS to join a group engaged in the development of improved insulating materials and processes for electrical machines. The work covers a wide and interesting field and includes the study of material properties, high-voltage phenomena, and the devising of realistic methods of assessing new insulation.

Applicants, who should have a degree or Higher National Certificate in Electrical Engineering and be free from National Service obligations, are invited to write to the Director of Research, The British Thomson-Houston Co. Ltd., Rugby, stating age, qualifications and experience, quoting reference SR. 1247

NORTH WESTERN ELECTRICITY BOARD

FOURTH ASSISTANT ENGINEER, SUB-AREA ENGINEER'S DEPT., OLDHAM

APPLICANTS should have had a thorough training in distribution practice, system calculation and protective gear application. Preference will be given to applicants who hold the H.N.C. in Electrical Engineering.

Salary scale £790 × £15 to £835 p.a., Grade K13. N.J.B. conditions.

Applications, naming three referees, to Sub-Area Manager, No. 3 Sub-Area, North Western Electricity Board, Union Street, Oldham, by 7th December, 1957. 1445

Applications are invited by
THE BENJAMIN ELECTRIC LTD.
for a
DESIGNER OF INDUSTRIAL LIGHTING EQUIPMENT.

Knowledge of fabricating techniques, finishes, lamps and control gear desirable, but initiative and ideas equally important.

Apply Chief Technical Engineer, Brantwood Works, Tottenham, London, N.17.

177

NORTH WESTERN GAS BOARD

Liverpool Group

Electrical Supervisor, Linacre Works

APPLICATIONS are invited for the above pensionable appointment at a salary within Grades A.P.T. 5/7 (£605/£785 p.a.).

Applicants should have had experience in the operation, repair, maintenance and installation of A.C. and D.C. motors and starters up to 500 h.p., and M.V. switchgear and fusegear, rectifiers, cables and conduits. Technical qualifications and previous experience in the control of electrical personnel would be an advantage.

Application should be made on the official form, obtainable by writing to the Chief Personnel Officer, Liverpool Group, N.W.G.B., Bold Street, Liverpool, 1, and should be returned to him within 14 days. 1453

CENTRAL ELECTRICITY AUTHORITY

Southern Division

SHIFT CHARGE ENGINEER, MARCHWOOD GENERATING STATION (S/13.971).

Applicants should have had previous operating experience in a large modern generating station with high temperatures and pressures and preferably with oil fuel or pulverised fuel equipment.

Preference will be given to those possessing qualifications admitting to corporate membership of a recognised professional institution.

Salary N.J.B. Grade K.7, £1,160-£1,235.

Special application forms obtainable only from P. D. A. Oliver, Divisional Secretary, Central Electricity House, High Street, Portsmouth, should be returned by 11th December, 1957. 1467

ELECTRICAL ENGINEER

required conversant with the general correspondence and technical detailing in connection with all quotations, etc., related to transformer and motor production. This is a senior appointment and a man with good experience in this range of activity is required.

The position offers full opportunity for advancement, and a man with ambition to progress is called for.

Applications stating full details of past experience to—

THE NELSON ENGINEERING CO. LTD.
Netherfield Road, Nelson, Lancashire

1431

INSTRUMENT MECHANIC

required for the maintenance and repair of a wide range of industrial instruments in a large chemical works. Candidates should preferably have served a recognised apprenticeship.

There is a merit-rating scheme in operation in the company, which ensures that good tradesmen will receive a high rate of pay. Canteen and excellent recreational facilities are available.

Applications in writing should be made to the

Labour and Welfare Officer (Oldbury)
ALBRIGHT & WILSON LIMITED
P.O. Box No. 3, Oldbury. 1390

ELECTRICAL ENGINEERS

LEADING manufacturers of automatic control gear require additional Design Engineers. Although experience in this field is desirable, training would be given to keen young men with the minimum technical qualification of H.N.C.

Applications should be addressed in confidence to Personnel Officer, Igranic Electric Co. Ltd., Bedford. 1429

AN electrical engineer is required for a junior post concerned with the design and development of electro-mechanical equipment for railway signalling and traffic control systems. Qualifications: Graduate or H.N.C. in Electrical Engineering or C. and G. Telecommunications Certificates. Those studying for the foregoing qualifications will be considered. Day release may be granted in special cases. 5-day week and pension scheme. Apply in writing, giving age, qualifications and previous experience, to the Personnel Superintendent, Westinghouse Brake & Signal Co. Ltd., Chippenham, Wilts, quoting ref. EED/1/ER. 1483

ADDITIONAL lift and crane surveyors are required by The Vulcan Boiler & General Insurance Co. Ltd. in the Preston & Warrington areas. Applicants should possess a Higher National Certificate in Mechanical Engineering or a First Class M.O.T. (Motor) Certificate, or equivalent qualifications. Age about 30 years. Commencing salary £735, rising by annual increments to £985, and then in stages to £1,060 per annum. Pensionable. Applications to 67, King Street, Manchester, 2. 1449

AN electronic engineer required by well-known instrument company in London. B.Sc. in Electrical Engineering essential. Age 22-28; to work on transistor circuit development for very interesting industrial applications. Salary £750/£850.—Box 1482

APPLICATIONS are invited for the position of senior transformer designer with a company in the North. Applicants should have experience in all aspects of design of transformers up to and including 20/30 MVA. Approximate salary £1,700 per annum for the position, which is permanent and progressive. Assistance will be given towards re-housing expenses. Apply, stating age and experience, to—Box 1218.

BRUSH ELECTRICAL ENGINEERING Company Ltd., Loughborough, Leics., invites applications for the position of a senior research and development engineer in their expanding switchgear division. The duties include the development of all new switchgear with associated investigations and also general research affecting switchgear and its applications. Applicants should have had a good engineering education, preferably with a science degree and with practical experience in industry. A good salary will be paid commensurate with this appointment. Applications giving particulars of past experience and qualifications should be addressed to the Manager, Switchgear Division, and should quote reference SD 7305. 1468

CABLE jointer wanted. Used to H.T. and L.T. jointing. Also must have experience of general installation.—Box 1357.

CHIEF electrical designer required for small and medium A.C. and D.C. machines. Apply, in confidence, giving details of age, experience and salary required to the Secretary, Bull Motors, Foxhall Works, Ipswich. 1231

CIRCUIT design draughtsmen required by company manufacturing industrial control equipment. Good salaries paid to "first-class" men. Canteen facilities, pension scheme. Housing assistance considered in approved cases. Write giving age, experience, etc., to—Personnel Officer, Dewhurst & Partner Ltd., Inverness Works. Inverness Road. Hounslow. Middx. 273

C. MAURICE CONTRACTORS Ltd., civil and electrical engineers, require electrical engineer with experience of large cable laying, jointing and substation construction contracts for supervisory work. Apply in writing to General Manager, Lindsey Road, Bishop's Stortford, Herts. 1307

DESIGN draughtsman (electrical) required by London firm of consulting engineers. Must have experience lighting/power and distribution layouts for large buildings, factories, hospitals, etc. Permanent post with good prospects and commencing salary up to £1,000 annum, dependent on training and experience. Contributory pension scheme and five-day week. —Box 1432.

DESIGN engineer required for transformers up to 25 kVA. Salary commensurate with experience. Good opportunity for person seeking improvement. Apply to—G. B. Electrical Services Ltd., 1, Goodmayes Road, Goodmayes, Ilford, Essex. 1493

DESIGNER draughtsman, leading firm of contractors London, has a senior appointment of wide scope and interest available to a first-class engineer able to design (and supervise site work) high-class electrical installations of all types. Good junior also required. Excellent prospects and salary. Write, experience, age and salary envisaged.—Box 1203.

DEWHURST & PARTNER Ltd. require technical estimator for preparing tenders in their estimating engineering department. Applicant must have good electrical engineering background and have basic knowledge of motor control equipment and its applications. The position is a senior one, and housing assistance will be given to successful applicant if necessary. Canteen facilities, pension scheme. Write giving age, experience, etc., to — Personnel Officer, Dewhurst & Partner Ltd., Inverness Works. Inverness Road, Hounslow, Middlesex. 274

DESIGN engineer/draughtsman required to develop range of outdoor switchgear by company newly entering this field. Must be able to develop standard range of connectors and isolators and prepare special schemes after discussion with clients. Apply giving full details of experience, present position and salary to—Box 1329.

EKCO-ENSIGN ELECTRIC Ltd. require two senior sales representatives for the London area. Must have good knowledge of the lighting industry and high-level contacts. Applications, in confidence, to—General Manager, Ekco-Ensign Electric Ltd., 45, Essex Street, London, W.C.2. 1438

ELECTRICAL contractors require an estimating engineer with sound knowledge of industrial installations. Progressive position for suitable applicant. Reply in strict confidence giving full details of age, experience and salary required to—Electric House (Denton) Ltd., Law Street, Denton, Manchester. 9202

ELECTRICAL fitters and fitters' mates, experienced in erection of all types of metal-clad L.V. and H.V. switchgear up to and including 11 kV, and outdoor gear up to and including 33 kV, together with the essential secondary wiring and cabling; required for contract work in South-East England.—Box 1252.

ELECTRICAL sales engineer having experience in motor control gear required for London office area. Vacancy offers good salary and is pensionable. Apply stating age, experience, etc., to—London Manager, Igranic Electric Co. Ltd., Victoria Station House, Victoria Street, London, S.W.1. 1459

ELECTRICAL salesman required for British West Africa for department handling all types of electrical appliances and accessories, radios and refrigerators. Progressive, permanent post for the right man, preferably aged 25/30. State if married and with family.—Box 1433.

ELECTRICIAN-fitters with experience in armoured cables, A.C. motors and industrial switchgear work, willing to travel London area. Write stating age and experience.—E.M.F. Ltd., 72, Farm Lane, Fulham, London, S.W.6. 1276

ENGINEER required for interesting development and experimental work in connection with electrical fire protection. Good future prospects. North London district. Salary £750/£800 p.a.—Box 1306.

ELECTRO-mechanical draughtsmen required for production drawing office of company engaged in the manufacture of control gear equipment. Good salaries paid to "first-class" men. Canteen facilities, pension scheme. Housing assistance considered in approved cases. Write giving age, experience, etc., to—Personnel Officer, Dewhurst & Partner Ltd., Inverness Works. Inverness Road, Hounslow, Middx. 275

ESTIMATING engineer required for preparing tenders for A.C. and D.C. switchgear, open and enclosed pattern switchboards. Canteen facilities, pension scheme. Apply to—Whipp & Bourne Ltd., Switchgear Works, Castleton, Rochdale. 1374

HIGH-voltage plumber-jointers and mates, experienced in jointing all classes of cables up to and including 11 kV, required for contract work in South-East England.—Box 1253.

IN the New Year an assistant sales manager will be required for an electrical wholesale company in British West Africa handling radio, domestic appliances and installation materials. Duties will comprise the development of sales through retailers and contractors and wide experience in this field is essential. Practical experience and knowledge of servicing would be an advantage. Commencing salary will depend on qualifications and experience, but will not be less than £1,250 per annum, and there are good prospects for advancement. Free furnished accommodation and medical attention provided in Africa. There is a contributory pension fund and income tax is low. Tours in West Africa would be about 21 months and would each be followed by approximately four months' leave on full pay. Generous family allowances, free first class passages provided. Apply giving full particulars to—Box 1361.

LIGHTING engineer with planning and contact experience required for Manchester office of Ekco-Ensign Electric Ltd. Apply—Manager, Blackett Street, Fairfield Street, Manchester, 12. 339

LONDON consulting engineers require electrical engineers for installation design for hospitals, commercial buildings, schools, etc. Write stating age, qualifications, experience and salary required to—Box 160.

M.T.E. CONTROL GEAR Limited require technical sales engineer manager for Greater London area. Must have sound technical knowledge in control gear and good existing business connections in the territory. Apply in writing to—Sales Director, Progress Road, Leigh-on-Sea, Essex. 1333

REPRESENTATIVE (age 25/35 years) for North West England, required by old-established manufacturers of electrical accessories, preferably with connection with architects, consultants, hospital boards, county councils, etc. Preferably resident in Manchester or Liverpool districts, able to drive. Salary, commission and expenses, contributory pension scheme. Age, qualifications to—Wandsworth Electrical Manufacturing Co. Ltd., Albert Drive, Sheerwater, Woking, Surrey. 1484

SALES manager required to develop sales of electric lamps in home and export markets and especially within the Co-operative movement. Technical knowledge desirable, advertising and display experience useful, but the main requirements are experience of selling and of the organisation and supervision of representatives through correspondence and occasional visits. Knowledge of and sympathy with the Co-operative movement will be assets. The individual appointed will have his headquarters in Glasgow. Applicants should write details of age and experience and indicate salary range required to Secretary, British Luma Co-operative Electric Lamp Society Limited, 95, Morrison Street, Glasgow, C.5. Closing date 9th December, 1957. 1434

SALES representative for S. Yorks and E. Lancs, etc., preferably already domiciled in triangle Leeds-Sheffield-Manchester. Electrically qualified and experienced to promote the sales of "Ashley" electric wiring accessories and, for associated company, "Astral" industrial switchgear and L.T. distribution equipment. Salary, commission, contributory pension, expenses, car and hard work provided. Health certificate required. Informative letters and photograph to Sales Director, Ashley Accessories Ltd., Ulverston, Lancs. Confidential consideration assured. 1311

SALES representative required with real live connections amongst factories, stores, contractors, etc., in London and Home Counties by old-established E.W.F. electrical wholesaler. Excellent prospects, good salary, expenses and commission. Write in confidence, stating age and experience, to—A. S. Duran & Co., 30, Kings Road, Reading. 1450

SENIOR or junior draughtsman required for work on electrical power resistors and heaters for industrial applications. Previous experience on this class of work is desirable but not essential. Apply giving details of experience, technical qualifications, age and salary required to—The Electrical Department of The Expanded Metal Co. Ltd., Stranton Works, West Hartlepool. 1376

SERVICE engineer required for inspection and maintenance of electrical equipment in the printing and newspaper industry, etc.—Box 1344.

SITE engineer required fully conversant large industrial installations and control of large labour force. Scope for advancement for suitable applicant.—Box 1435.

SITUATION available for senior switchgear designer experienced in the general mechanical and electrical design work associated with high-power switchgear and circuit breakers up to 132 kV. Previous experience on the lines indicated preferable, but design experience on associated equipment will be considered. Applications giving age, education and full details of experience, together with salary required, to the Personnel Manager. South Wales Switchgear Ltd., Blackwood, Mon. 1408

SOUTH WALES SWITCHGEAR Ltd., Blackwood, Mon., have vacancies for draughtsmen in the high-voltage switchgear contract and diagram sections of their drawing office. Applications, giving full particulars of experience, age and qualifications, to—The Personnel Manager. 1451

SUPERVISING engineer required by electrical engineering and contracting co. for service in East Africa. Applicant must be able to prepare schemes and quotations for all types of installations, and preference will be given to applicants with knowledge of o.h. lines. Salary according to qualifications and experience. Apply Marryats E. A. Ltd., 40, Hatton Garden, London, E.C.1. 1409

TECHNICAL assistants required by Hoover Ltd. for product control department. (1) investigation engineer with experience in light electro-mechanical engineering. (2) control test engineer with previous quality control or inspection experience. Applicants should be aged 22-30 and have H.N.C. (elect.) or equivalent. Salary at age 25 will be £785, plus bonus. Apply stating age, qualifications and experience to—Employment Officer, Hoover Ltd., Perivale, Greenford, Middx. 1469

TELEPHONE engineer/mechanic, first-class, required, large firm engineers, 12 months' service overseas. Excellent opportunity. Write age, experience.—Box 1334.

TESTER of automatic electric control equipment required. Interesting work with good prospects. O.N.C. standard preferred. Five-day week, pension scheme, canteen facilities. Please write giving full details of age, previous experience, qualifications, etc., to—Personnel Officer, Dewhurst & Partner Ltd., Inverness Road, Hounslow, Middlesex. 277

THE ALUMINIUM DEVELOPMENT ASSOCIATION requires an electrical engineer to further the development of new uses of aluminium in this field. The duties include investigation of the technical problems involved, compilation of technical data, and advising equipment manufacturers and users. There is ample scope for contact with manufacturers and users of electrical equipment, and with research organisations. Applicants should be graduates in electrical engineering or hold appropriate qualifications of the Institution, with some experience. The post is pensionable, and the commencing salary will be at least £1,000 per annum, according to qualifications and experience. Applications, giving full details, should be sent in confidence to the Technical Director, 33, Grosvenor Street, London, W.1. 1460

THE STEEL COMPANY OF WALES Limited (Tinplate Division), Trostre Works, Llanelly, Carms., require at their modern cold reduced tinplate plant, young electrical engineers. Candidates should have served a recognised apprenticeship and possess a minimum qualification of H.N.C. Duties will include maintenance and development on a variety of costly equipment and machinery. Good working conditions, including excellent canteen facilities. Commencing salary up to £1,100 per annum, dependent on qualifications and experience. The successful candidate will be eligible to join a contributory pension scheme. Applications, giving full details of education, experience and salary required, should be addressed to the Supt. Labour and Wages, The Steel Company of Wales Limited (Tinplate Division), Carmarthen Road, Swansea, Glam., to be received within 10 days of the date of this advertisement. 1422

TRADE counter assistant stock records and pricing clerk required by electrical wholesalers.—Batt Electrical Co., 6, Dock Street, London, E.1. 1485

WANTED for electrical consultant's dept. of large firm of architects in Bloomsbury (a) junior electrical engineer; (b) young electrical draughtsman, for installation schemes in large buildings. Apply, giving full details of education, training and salary required, to—Box 1313.

WINDING shop departmental foreman required by large firm in Eastern England manufacturing wide range of A.C. and D.C. rotating machinery. Applicant should have experience of modern H.T. and L.T. winding methods. Good salary, bonus and pension fund, and assistance in housing, to man with experience seeking interesting and progressive post. Applications will be treated in strict confidence.—Box 1236.

APPOINTMENTS FILLED

Dissatisfaction having so often been expressed that unsuccessful applicants are left in ignorance of the fact that the position applied for has been filled, may we suggest that Advertisers notify us to that effect when they have arrived at a decision? We will then insert a notice free of charge under this heading.

SITUATIONS WANTED

CABLE jointer experienced in voltages up to 22 kV desires position abroad. Willing to go immediately. Excellent references.—Box 9211.

CHARTERED electrical engineer, twenty years' experience H.V. transmission lines, cables, substation equipment, seeks post home or abroad.—Box 9213.

***Situations Wanted** (continued)*

A PUBLIC school man aged 30 seeks administrative position. 10 years' experience with leading electrical manufacturers, covering market research, sales promotion and selling abroad. Specialised knowledge of electrical consumers' requirements in European and African markets. Fluent French.—Box 276.

ELECTRICAL site engineer/agent, age 39, extensive installation experience, capable, energetic, seeking new situation, home near London.—Box 9208.

TRAVELLER with London wholesaler, C.M.A, etc., seeks change. Turnover £35,000 p.a., mainly West London and western outskirts.—Box 9195.

YOUNG electrical engineer (26), B.Sc., A.C.G.I., served apprenticeship, shortly completing National Service in Royal Navy (L. branch) desires situation where he can gain experience in industrial applications of electronics, automation, etc. Available February, 1958.—Box 1486.

YOUNG R.E.M.E. officer, Grad. I.E.E., 8 years' experience in supply industry, seeks appointment in private firm, home or overseas.—Box 9192.

ARTICLES FOR SALE

ELECTRICAL EQUIPMENT FOR SALE

1500-h.p. B.T.H. Rolling Mill Motor, 3,300/3/50, 211 r.p.m.
1070-h.p. BRUCE PEEBLES ditto, 3,300/3/50, 495 r.p.m.
750-h.p. BROWN BOVERI ditto, 2,200/3/50, 146 r.p.m.
2500-h.p. Reduction Gear, ratio 5.3 to 1.

F. BURRILL & CO.
235a, Cathedral Road, Cardiff
(Tel. 26100) 1487

ELECTRICAL EQUIPMENT FOR SALE

STAL TURBO-ALTERNATOR.

350 lb., 7,800 kVA max., 10,000 volts, 50 cycles, year 1940.

3-PHASE, 50-CYCLE ALTERNATORS.

3200 kVA	214 r.p.m.
1500 kVA	750 r.p.m.
900 kVA	300 r.p.m.
800 kVA	1000 r.p.m.

3-PHASE, 50-CYCLE MOTORS.

3600 h.p.	295 r.p.m.	Asynchronous
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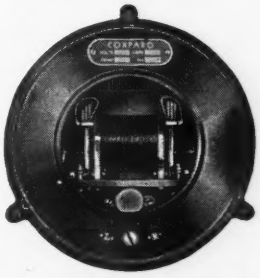

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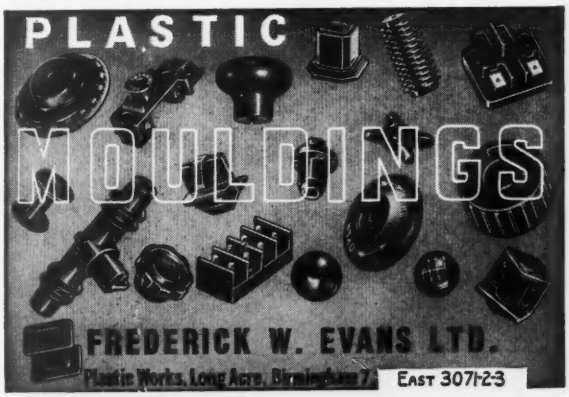

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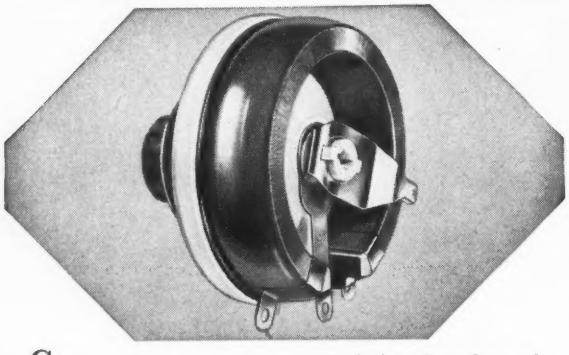

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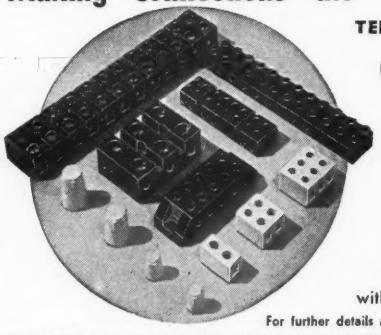

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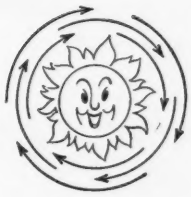

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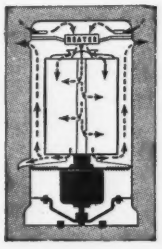

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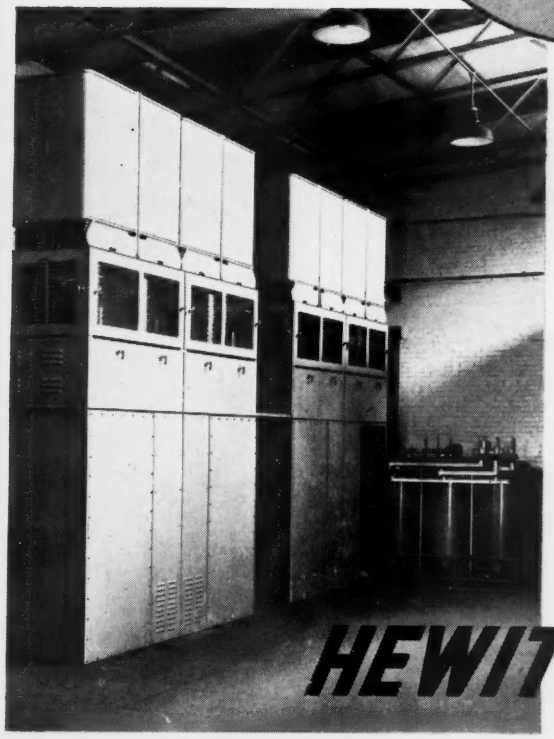

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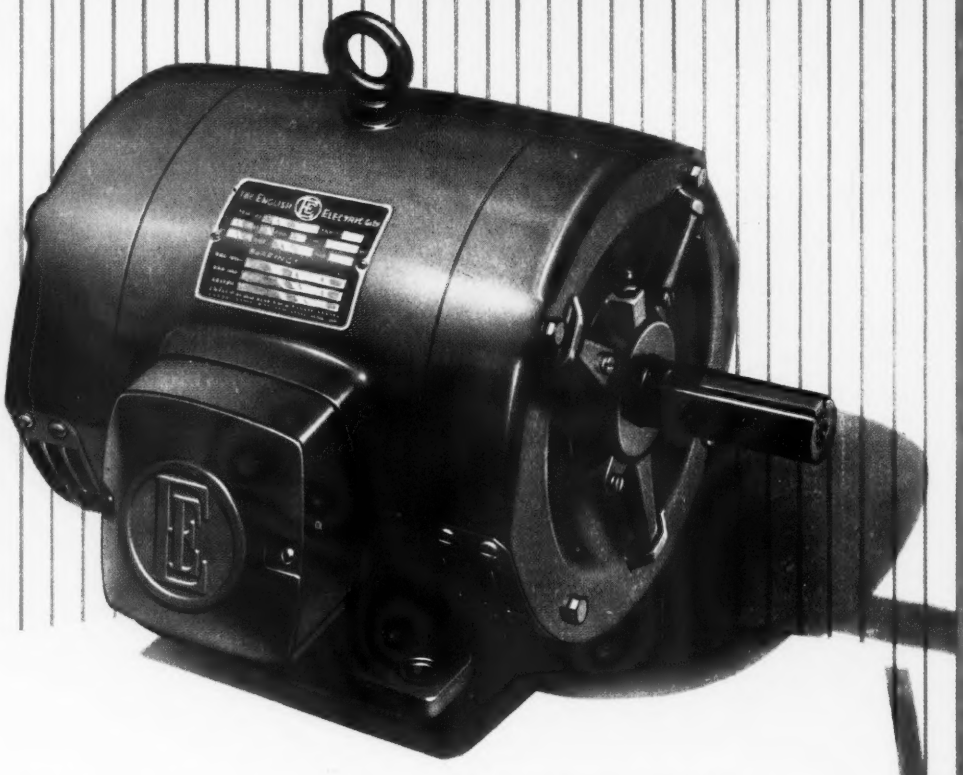

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